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Neighbourhood Characteristics and the Distribution of Crime in Saskatoon

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by **Mathieu Charron, Statistics Canada**

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Introduction

This research paper explores the spatial distribution of crime in the City of Saskatoon and the characteristics of high crime neighbourhoods. The analyses are based on data from the 2001 Census and police-reported crime data from the Incident-based Uniform Crime Reporting Survey (UCR2).

This study is part of a series of spatial analyses of crime data in Canadian cities conducted by Statistics Canada using a Geographic Information System (GIS). These studies, which were funded by the National Crime Prevention Centre at Public Safety Canada, examine the relationships between the spatial distribution of crime and characteristics of neighbourhoods.

Spatial analysis of crime data provides a visual representation of areas of concentrated crime and helps identify neighbourhood characteristics related to crime levels. It can be an important tool for the development and implementation of crime reduction strategies.

The various mapping studies undertaken by the Canadian Centre for Justice Statistics support an ecological view of crime, especially as regards theories of social disorganization and routine activities, or opportunities for crime. In keeping with this approach, the juxtaposition of the spatial distribution of crime and the environmental characteristics of neighbourhoods is examined to verify whether certain local characteristics (i.e., low-income and economic activity) are likely to foster crime. However, this report does not look at the individual characteristics of perpetrators or victims of crime, but rather at the environmental characteristics of the neighbourhood.

In the Canadian context, studies on neighbourhood characteristics and the distribution of crime (Fitzgerald; Wisener and Savoie 2004; Savoie, Bédard and Collins 2006; Wallace, Wisener and Collins 2006; Kitchen 2006; Andresen and Brantingham 2007; Savoie 2008) revealed that crime is not randomly distributed in cities; but is concentrated in certain neighbourhoods.

The data used are those from the 2001 Census of Population and the 2001 Incident-based UCR2 Survey. The latter data are reported by the police and provide a particular perspective on the nature and extent of crime. In other words, they cover only crimes known to and reported by the police. Many factors can influence the crimes reported to police, including the public's willingness to report crimes to the police and changes in legislation, policies or enforcement practices.

The Census of Population is conducted by Statistics Canada every five years, most recently in 2006. At the time of this study, some detailed data from the 2006 Census on population characteristics were not yet available. To achieve the highest

degree of compatibility between neighbourhood characteristics derived from the Census and crime information, this report draws on police and Census data from 2001.

This report is divided into five sections. The first section provides the local context for the City of Saskatoon. In the second section, crime data in Saskatoon are presented and mapped. The third section offers a more detailed analysis of crime rates in the western and eastern sectors of the city and by neighbourhood. In the fourth section, the main factors for differentiating the dissemination areas (DAs) of Saskatoon are presented, along with the relationships between these characteristics and crime. This analysis is different from the earlier ones by its use of factor analysis to define the characteristics of neighbourhoods and specific categories of crimes (assault, mischief, break and enter, motor vehicle theft, shoplifting and other thefts) as crime indicators. The final section contains the discussion and the conclusion.

Local context

The City of Saskatoon, with a population of 196,811 in 2001,[1] constitutes the main municipality in the Saskatoon census metropolitan area (CMA), which had a population of 225,927 in 2001. The Saskatoon CMA is the most populous in Saskatchewan, followed by Regina (192,800 inhabitants in 2001), and ranks 17th among the 27 CMAs in the country.

Text box 1

Geographic definitions

The **census metropolitan area** (CMA) is an area consisting of one or more adjacent municipalities situated around a major urban core. To be included in the CMA, other adjacent municipalities must have a high degree of integration with the central urban area, as measured by commuting flows derived from the Census place of work data. With the exception of some contextual elements in the first section, analyses in this document are based on the **City of Saskatoon**, and not on the entire CMA. The City of Saskatoon is the most populous municipality of the Saskatoon CMA in terms of residents and workers.

Neighbourhoods mentioned in the document were defined by the City of Saskatoon Community Services Department, City Planning Branch as planning units which are representative of local communities. In the current study, boundaries of 69 neighbourhoods have been recreated from the census blocks of Statistics Canada in order to calculate crime variables and neighbourhood characteristics. A **block** is an area bounded on all sides by roads and/or boundaries of standard geographic areas. Since block boundaries do not always follow neighbourhood boundaries, all official neighbourhood boundaries have not been exactly reproduced.

Statistics Canada **dissemination areas** (DAs) are small areas composed of one or more blocks, with a population of 400 to 700 persons. DAs have been used rather than neighbourhoods for multivariate analyses in the third section of this study because they are more numerous (128).

In contrast to the trend observed in the province of Saskatchewan, the Saskatoon CMA experienced uninterrupted growth in its population between 1990 and 2001.[2] According to Statistics Canada's population estimates,[3] this growth was essentially maintained by natural growth, the growth that results from more births than deaths, (+6,144 between 1996 and 2001) and a sub-provincial migration balance (+4,907), which offset a negative interprovincial migration balance (-7,916). In other words, many residents leave the Saskatoon CMA for other provinces, while many residents from elsewhere in Saskatchewan come to live in the CMA.

With a median age of 34.4 years, the Saskatoon CMA was Canada's youngest city in 2001, followed by the Calgary CMA (34.9 years). In the same year, the Saskatoon CMA also had the highest percentage of Aboriginal people in its population (9.1%), followed by Winnipeg (8.4%).

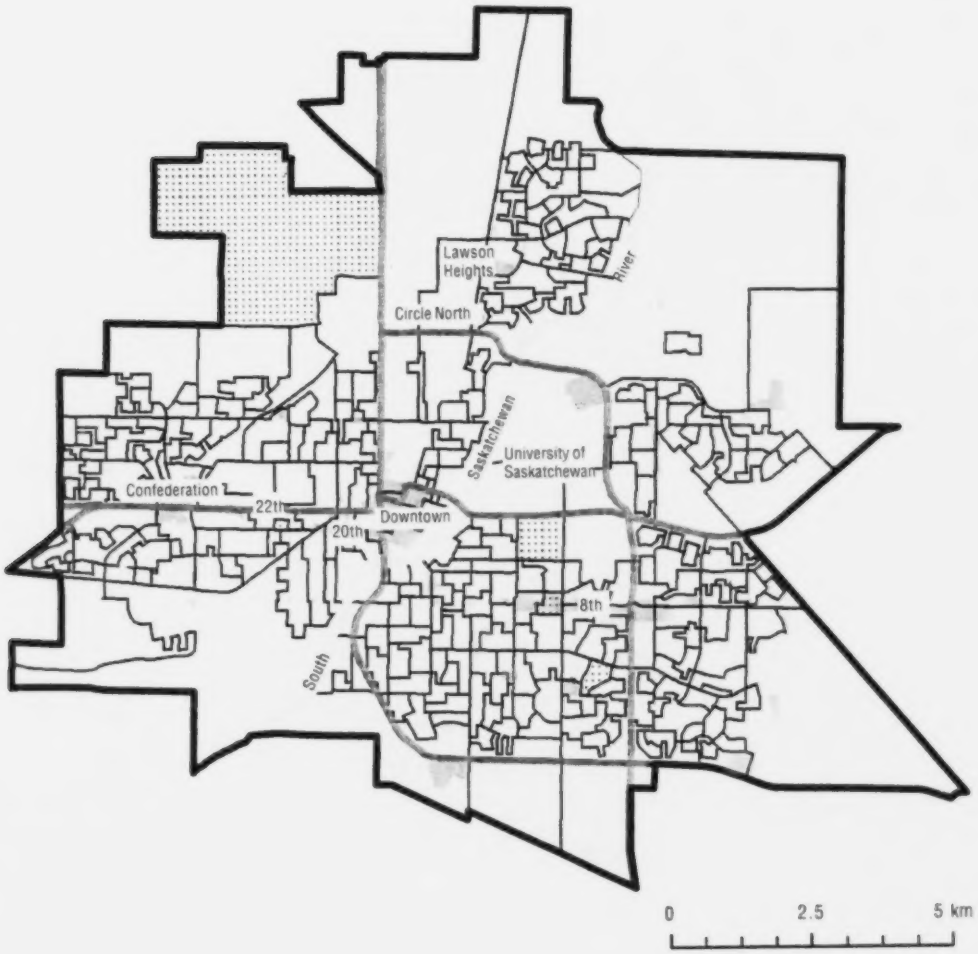
The City of Saskatoon is divided by the South Saskatchewan River (Map 1). Seven bridges connect the east and west sections of the city. The city's downtown area is located on the west side. As a result of revitalization in the 1950s and 1960s, the downtown now has several large commercial establishments, along with condominium projects developed in the 1980s.

On the west side of the South Saskatchewan River, the neighbourhoods adjacent to the downtown area, and especially Pleasant Hill and Riversdale (Map 2), are made up of populations with lower socio-economic resources (City of Saskatoon, 2005; Wilkie and Berdahl, 2007). According to 2001 Census data, 63% of the residents in these neighbourhoods lived in a low-income family, 29% lived in a lone-parent family and 47% were Aboriginal peoples.

The socio-economic profile is different east of the river where neighbourhoods are wealthier (City of Saskatoon, 2005; Wilkie and Berdahl, 2007). The University of Saskatchewan is located in this part of the city, north of the Nutana neighbourhood. All of the CMA's university activities are consolidated on a vast 12-square-kilometre campus. The university has almost 20,000 registered students.

Saskatoon's commercial activities are mainly concentrated in a few shopping centres (e.g. Confederation shopping area, The Mall at Lawson Height), on a few commercial arteries (Circle Drive North, 8th, 20th and 22nd Streets) and in the downtown area.

Map 1
Local context and dissemination areas (DAs), City of Saskatoon, 2001

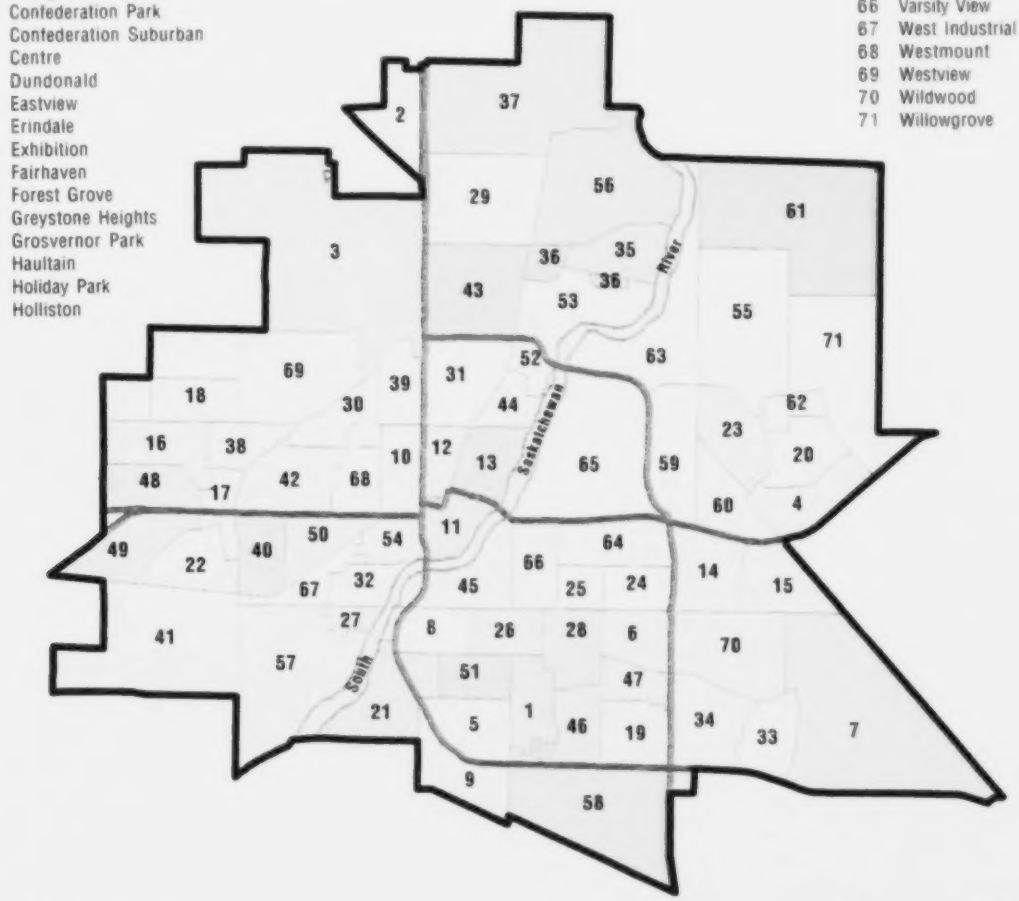


Sources: Statistics Canada, Census, 2001 and City of Saskatoon, Community Services Department, City Planning Branch, 2007.

Map 2

City of Saskatoon neighbourhoods, 2007

1 Adelaine - Churchill
2 Agriplace
3 Airport
4 Arbor Creek
5 Avalon
6 Brevoort Park
7 Briarwood
8 Buena Vista
9 C.N. Industrial
10 Caswell Hill
11 Central Business District
12 Central Industrial
13 City Park
14 College Park
15 College Park East
16 Confederation Park
17 Confederation Suburban Centre
18 Dundonald
19 Eastview
20 Erindale
21 Exhibition
22 Fairhaven
23 Forest Grove
24 Greystone Heights
25 Grosvernor Park
26 Haultain
27 Holiday Park
28 Holliston
29 Hudson Bay Industrial
30 Hudson Bay Park
31 Kelsey-Woodlawn
32 King George
33 Lakeridge
34 Lakeview
35 Lawson Heights
36 Lawson Heights Suburban Centre
37 Marquis Industrial
38 Massey Place
39 Mayfair
40 Meadowgreen
41 Montgomery Place
42 Mount Royal
43 North Industrial
44 North Park
45 Nutana
46 Nutana Park
47 Nutana Suburban Centre
48 Pacific Heights
49 Parkridge
50 Pleasant Hill
51 Queen Elizabeth
52 Richmond Heights
53 River Heights
54 Riversdale
55 Silverspring
56 Silverwood Heights
57 South West Industrial
58 Stonebridge
59 Sutherland
60 Sutherland Industrial
61 University Heights Development Area
62 University Heights Suburban Centre
63 University of Saskatchewan Lands - North
64 University of Saskatchewan Lands - South
65 University of Saskatchewan Management Area
66 Varsity View
67 West Industrial
68 Westmount
69 Westview
70 Wildwood
71 Willowgrove



Note: The neighbourhoods were recreated by aggregation of census blocks. In a few exceptional locations, the neighbourhood boundaries as defined by the blocklevel aggregation do not exactly correspond to the official boundaries.

Source: City of Saskatoon, Community Services Department, City Planning Branch, 2007.

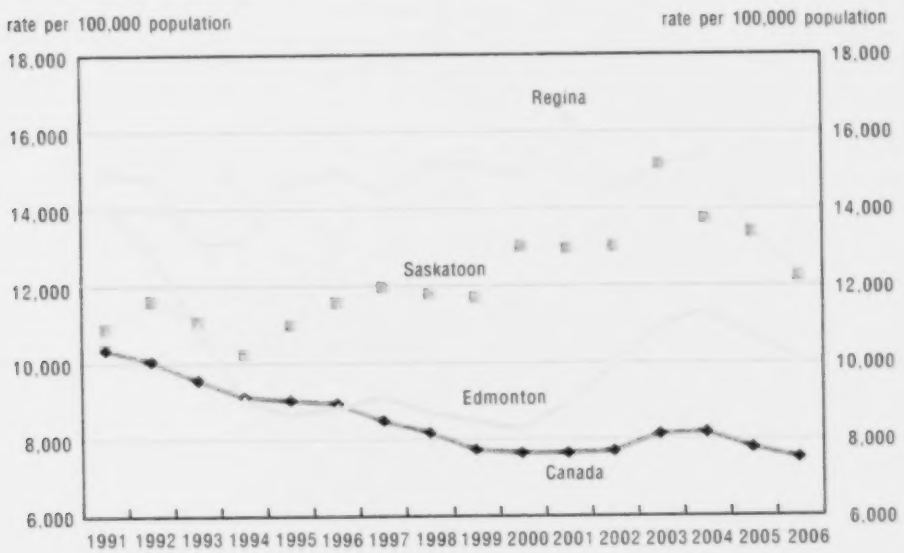
Police service, crime and victimization

The City of Saskatoon is entirely serviced by the Saskatoon Police Service, which employed 330 officers in 2001 (Filyer, 2002).

Since 1991, the crime rate recorded by the Saskatoon Police Service has been higher than that of all metropolitan areas in Canada (Chart 1). In 2001, with close to 13,000 crimes per 100,000 inhabitants, it was higher than the Canadian average by over 5,000 crimes per 100,000 residents. As in Regina, but in contrast to the national trend, the crime rate rose in the Saskatoon CMA between 1991 and 2003. These two CMAs have had the highest crime rates in the country for several years. However, since 2003, the crime rate has dropped substantially in the Saskatoon CMA.

Chart 1

Crime rates[1] in selected census metropolitan areas, Canada, 1991 to 2006



1. Rates based on count of total *Criminal Code* incidents excluding traffic offences.

Source: Statistics Canada, Canadian Centre for Justice Statistics, Uniform Crime Reporting Survey, 1991 to 2006.

The 2004 General Social Survey (GSS) of self-reported victimization showed that the victimization rate of Saskatoon households was the highest in the country, with 572 incidents per 1,000 households (Gannon and Mihorean, 2005). This was more than twice the Canadian rate of 248 incidents per 1,000 households.

Portrait of crime in 2001

This study explores 21,933 selected[4] and geo-referenced[5] police-reported incidents (Table 1). The crime rate—the number of crimes per 100,000 residents—was nearly twice as high in Saskatoon (11,144) than it was in Canada as a whole (6,597).

Table 1
Number of police-reported crime incidents, City of Saskatoon and Canada, 2001

	Saskatoon[1]		Canada[2]	
	number		number	
Population	196,811		18,794,862	
	number	rate (per 100,000)	number	rate (per 100,000)
Selected incidents[3]	21,933	11,144	1,239,880	6,597
Total violent incidents[4]	3,681	1,870	203,733	1,084
Homicide[5,6]	5	3	844	4
All sexual offences[5,7]	189	96	13,234	70
Assault[5]	2,331	1,184	124,291	661
Robbery[5]	476	242	21,950	117
Total property incidents[4]	17,327	8,804	956,999	5,092
Arson[5]	176	89	8,598	46
Break and enter[5]	3,896	1,980	181,491	966
Mischief[5]	3,967	2,016	192,655	1,025
Motor vehicle theft[5]	1,205	612	114,736	610
Shoplifting[5]	1,217	618	49,953	266
Other theft[5,8]	6,028	3,063	410,812	2,186
Total other incidents[4,9]	925	470	76,078	405
Prostitution[5]	44	22	4,096	22
Drug incidents[5]	445	226	46,640	248

1. Only geocoded incidents are shown.
2. In 2001, detailed data were collected from 154 police services through the UCR2 survey. These data represent 59% of the national volume of reported actual *Criminal Code* crimes.
3. For more detailed information on selected incidents, see "Data sources" in the Methodology section.
4. Includes most serious violation in each incident only.
5. Includes all recorded violations in each incident.
6. Includes attempted murder and conspire to commit murder.
7. Includes sexual assault (levels 1 to 3) and other sexual violations.
8. Excludes incidents of motor vehicle theft and shoplifting.
9. Includes prostitution, offensive weapons, gaming and betting and other *Criminal Code* offences.

Source: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, 2001.

However, the distribution of these incidents by type of crime is quite similar to the distribution observed in the rest of the country. In Saskatoon, and in the rest of Canada, violent incidents represented about one sixth of reported crimes, while property crimes accounted for over three-quarters of reported crimes.

Spatial distribution of crime

Police-reported crime is not distributed randomly within the boundaries of the City of Saskatoon. The downtown area and the central neighbourhoods of Riversdale and Pleasant Hill, located on the west side of the South Saskatchewan River, accounted for large portions of all types of crime (Map 3, Map 4 and Map 5). To a lesser degree, the Confederation shopping area and the commercial strips on Idylwyld Drive, 8th Street and 33rd Street, also represented crime hotspots. Findings from other research suggest that this pattern of crime distribution is relatively stable over time. For example, Kitchen (2006) reported that in 2003 the crime hotspots were located in the city's western area, and especially its core.

The broader police-reported crime incident categories (violent crime, property crime and others) include types of crimes that differ with respect to their spatial distribution For example, a neighbourhood where mischief incidents are frequently reported is not necessarily going to also experience frequent reporting of shoplifting incidents. However, both of these types of crimes are included in the same broader category of property offences. For this reason, it is important to have an understanding of the spatial distribution of more precise categories in order to better understand the environmental circumstances that influence crime. The analyses below concentrate on the types of crime that were reported in over 1,000 incidents and make up over 5% of the total geocoded crime incidents:[6] assault, motor vehicle theft, mischief, break and enter, other thefts (excluding motor vehicle theft and shoplifting) and shoplifting.

The spatial distribution of assaults (Map 6) is very similar to that of violent incidents, which is explained by the fact that two-thirds of incidents involving violence include at least one assault. These incidents mainly occurred in the city's western section: the downtown area and the neighbourhoods bordering it to the west. Some commercial locations also have significant concentrations of this type of crime.

Motor vehicle theft incidents show a similar spatial structure (Map 7): a high concentration in the downtown area and in the Riversdale and Pleasant Hill neighbourhoods, and moderate concentrations in the commercial areas. Motor vehicle thefts were also much more frequent in the western part of the city.

Mischief (Map 8) and break and enter incidents (Map 9) follow relatively similar patterns of spatial distribution. However, they generally occurred much more often in residential areas, which appeared to be "warm spots" for this type of crime. Commercial areas are the other focal points for this type of crime.

Incidents involving theft (excluding motor vehicles and shoplifting) show a slightly different spatial distribution than previously observed incidents (Map 10). The main hotspots were the downtown area and the Confederation shopping area.

The Riversdale and Pleasant Hill neighbourhoods also appeared to be hotspots but the concentration was much lower than for the types of crimes previously discussed. The other high-incident areas are the commercial locations. Residential areas experienced substantially fewer incidents than the commercial locations.

Lastly, shoplifting incidents are particularly concentrated in areas of significant commercial activity (Map 11). More than half of the shoplifting incidents were reported in the Confederation shopping area, in the downtown area or on 8th Street. The other hotspots correspond to the other commercial areas.

Text box 2

Crime rates

The preceding descriptions were based on counts of crime incidents. They identified crime hotspots, locations where there are high concentrations of crime.

It is not surprising that high crime areas are generally located where there is intense human activity. In contrast, few crimes are reported in areas where few people live or congregate.

To better understand the spatial organization of crime, it is appropriate to consider the spatial distribution of the population. To this end, counts of crime incidents are related to the at-risk population using the following equation:

Crime rate = number of crimes ÷ population at risk

The crime rate measures the number of crimes per member of the population at risk. This spreads out the impact of the population over the volume of crime. For example, if we compare the number of crimes reported, Toronto (272,025) has almost ten times more crimes than Saskatoon (29,875) in 2006. However, if we compare the number of crimes per resident of these two metropolitan areas, the inhabitants of Saskatoon (12,209 crimes per 100,000 inhabitants) were much more at risk than the residents of Toronto (5,020 crimes per 100,000 inhabitants).

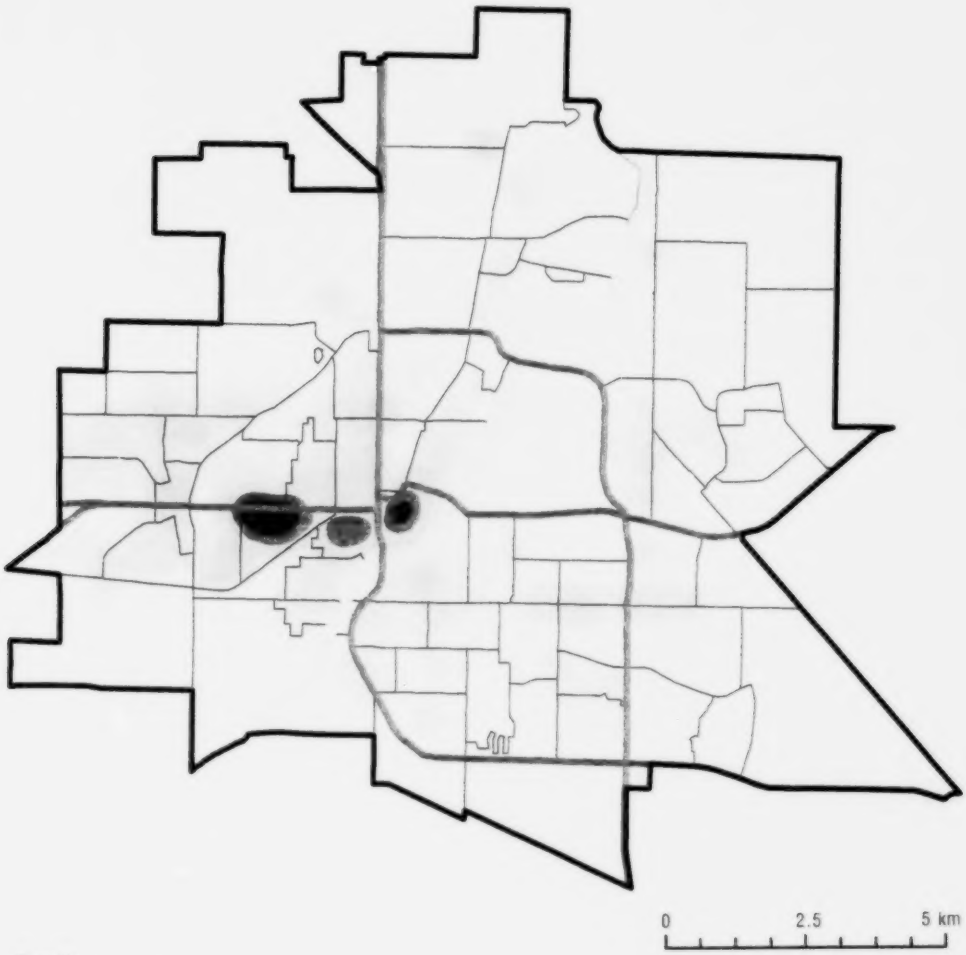
Measuring the at-risk population is simple when the spatial units compared are countries, provinces or metropolitan regions. The population of these entities is relatively stable over time so that the number of inhabitants accurately represents the real activity regardless of the time, day or season.

Measuring the population at risk is more difficult in neighbourhoods. Residents of cities move regularly from one neighbourhood to another, often within the same day. In this context, the population counted at the place of residence is not representative of the comings, goings and gatherings that define the complexity of cities.

For example, the population surveyed at place of residence is not very high in commercial locations and employment hubs. However, these locations are sites of intense human activity and therefore they bring together the conditions favourable to crime: potential victims and aggressors. The descriptions in the previous section revealed that the downtown area and several commercial areas account for much more crime than most of the residential neighbourhoods.

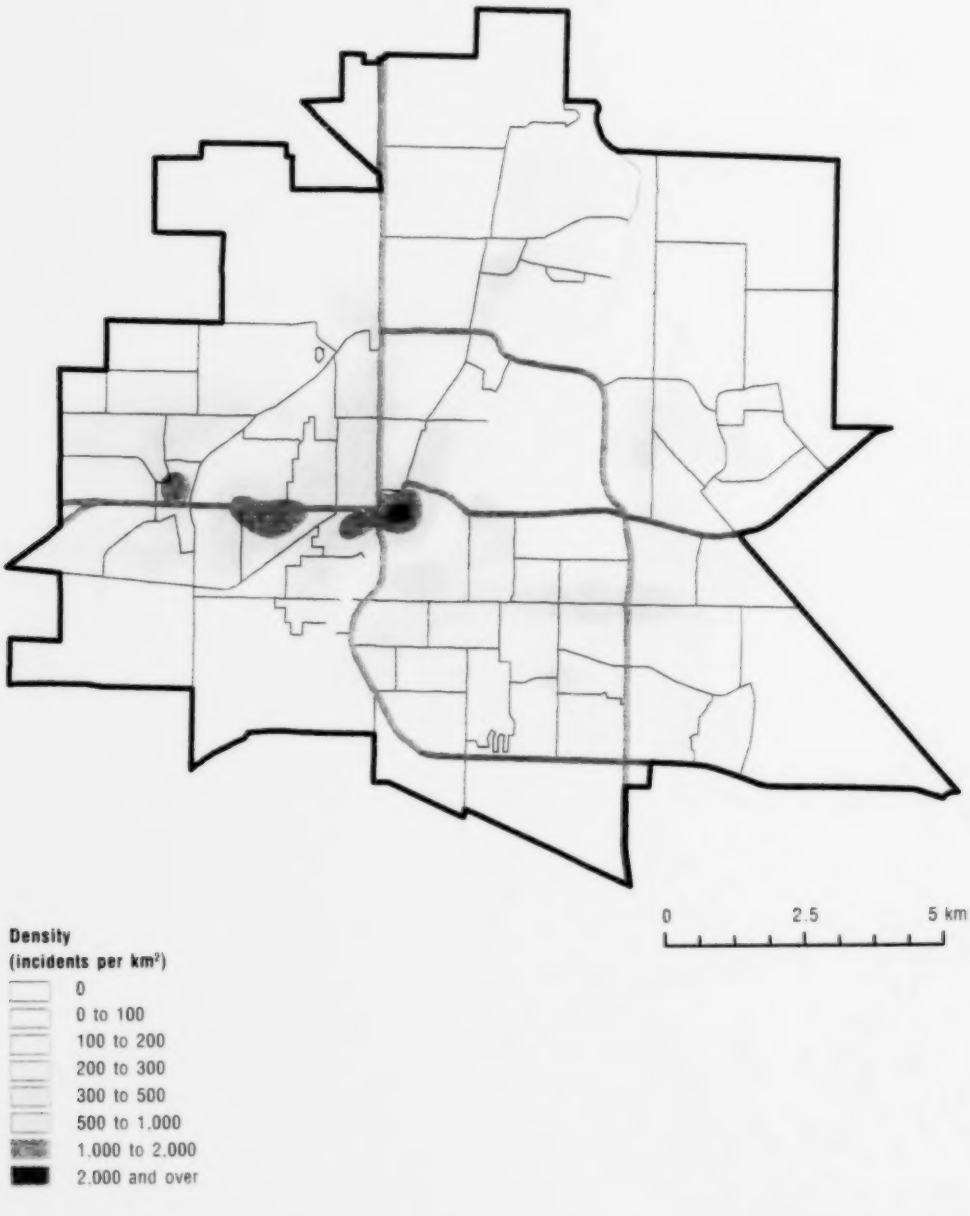
This means that when neighbourhoods are compared, the population at risk must be measured as the ambient population, that is, the population that may be in that location at all times of the day (Andresen, 2006). The Canadian Census of Population provides an accurate measure of the population on the basis of residence and workplace location. In earlier analyses of the spatial distribution of crime in cities conducted by Statistics Canada (Fitzgerald et al., 2004; Savoie et al., 2005; Wallace et al., 2005; Savoie, 2006), the ambient population was measured as the sum of these two populations.

Map 3
Density of police-reported violent crime incidents, City of Saskatoon, 2001



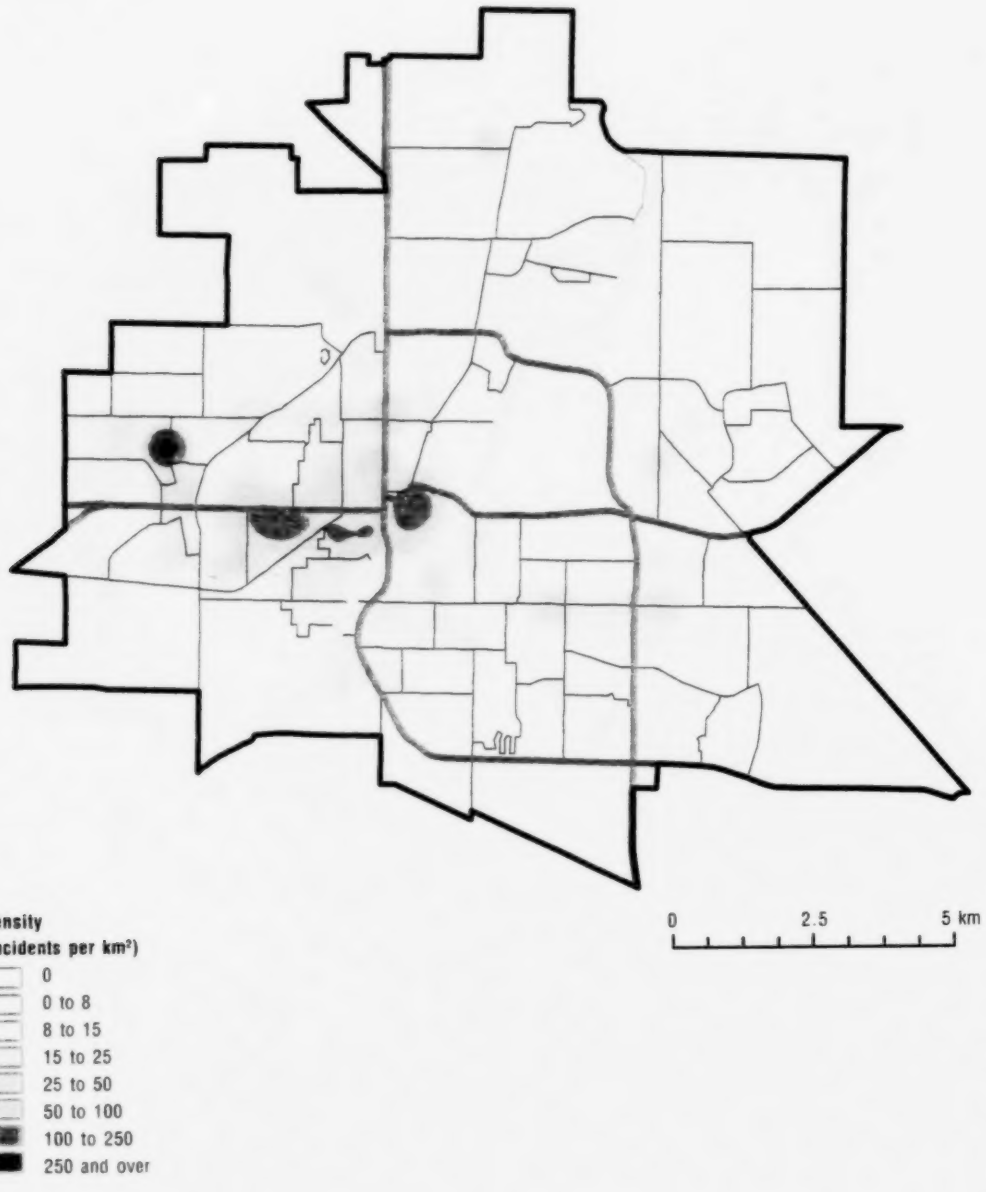
Based on 3,681 violent crime incidents.
Source: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, geocoded database, 2001.

Map 4
Density of police-reported property crime incidents, City of Saskatoon, 2001



Based on 17,327 property crime incidents.
Source: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, geocoded database, 2001.

Map 5
Density of other police-reported *Criminal Code* incidents, City of Saskatoon, 2001



Based on 925 other *Criminal Code* incidents.
Source: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, geocoded database, 2001.

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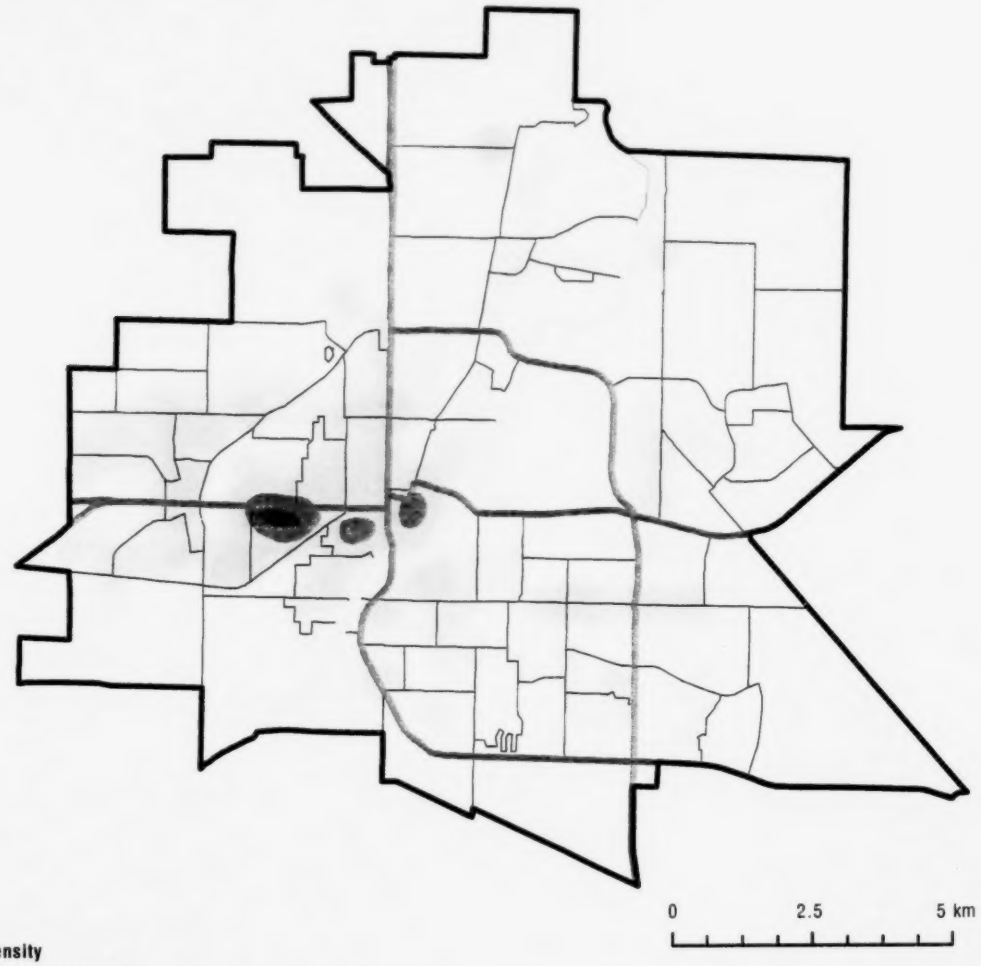
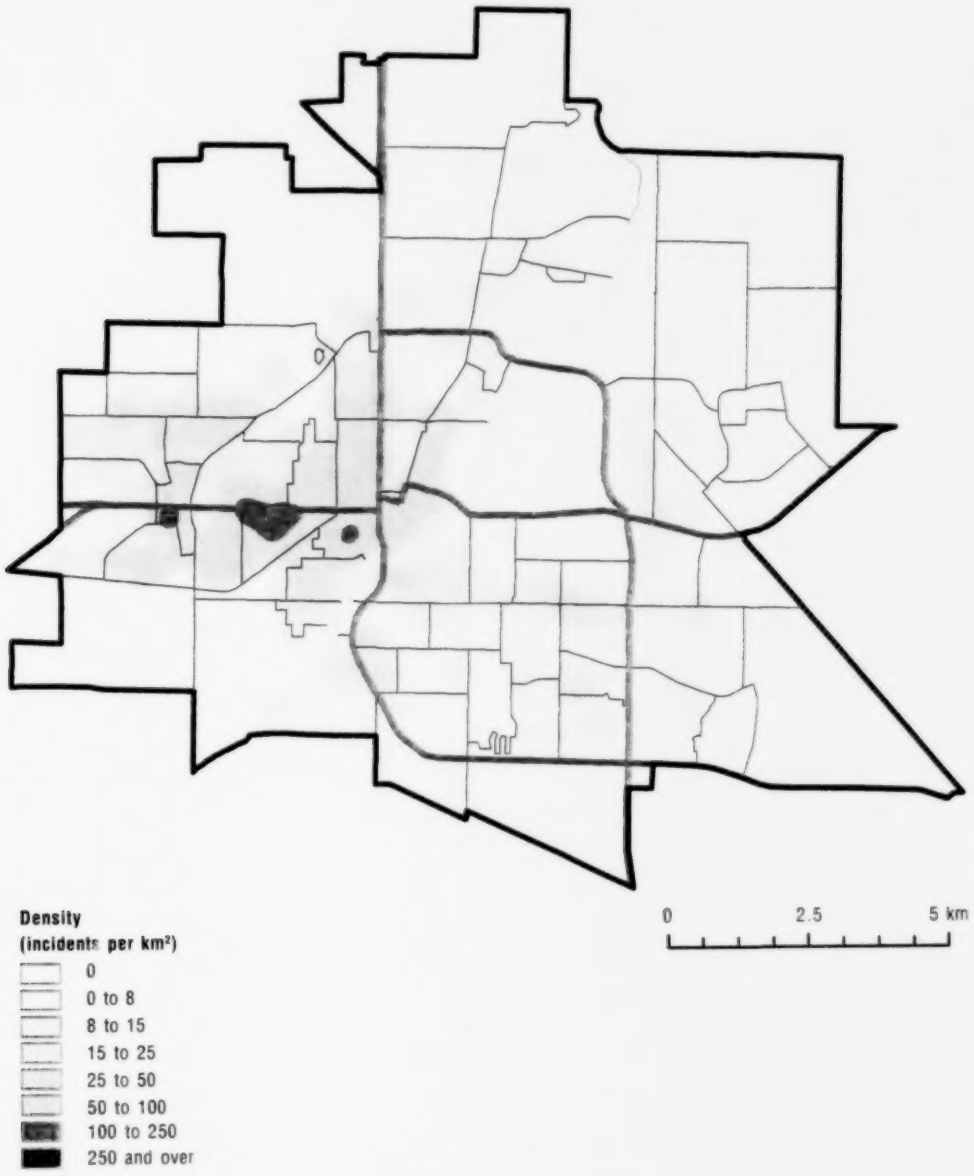
Map 6
Density of police-reported assault incidents, City of Saskatoon, 2001



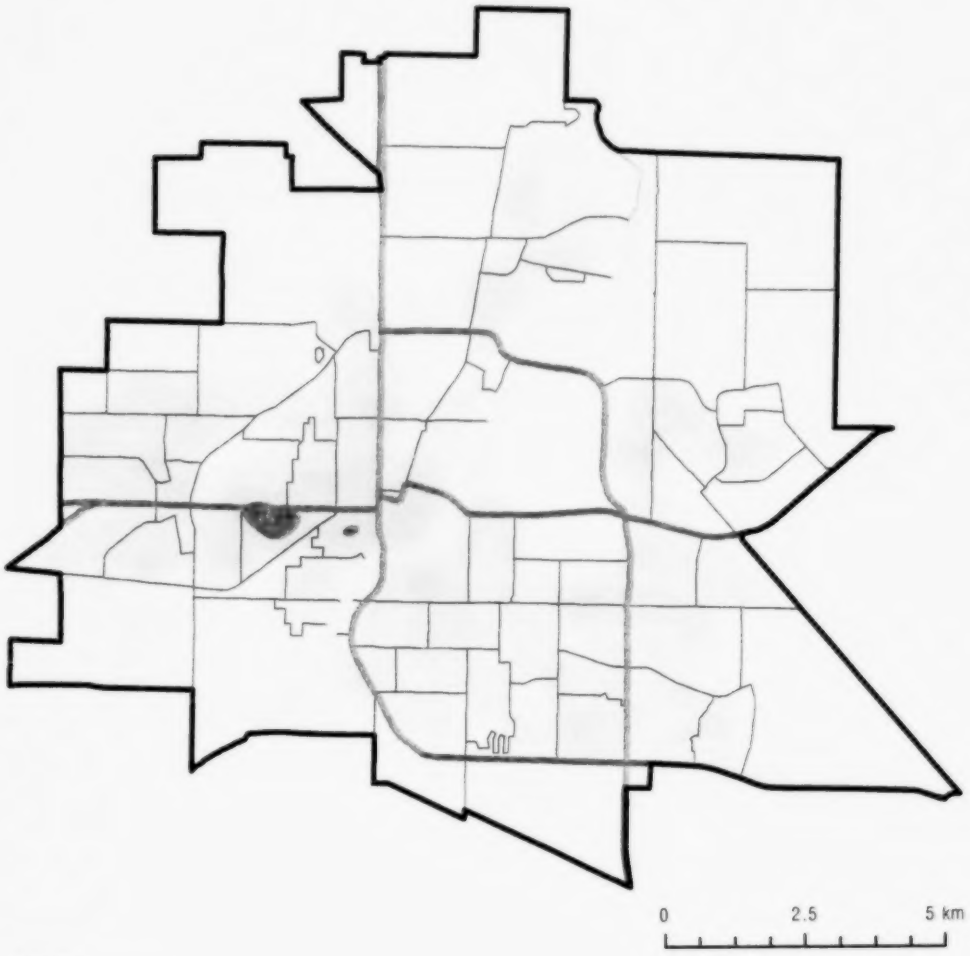
Based on 2,331 assault incidents.
Source: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, geocoded database, 2001.

Map 7
Density of police-reported motor vehicle theft incidents, City of Saskatoon, 2001



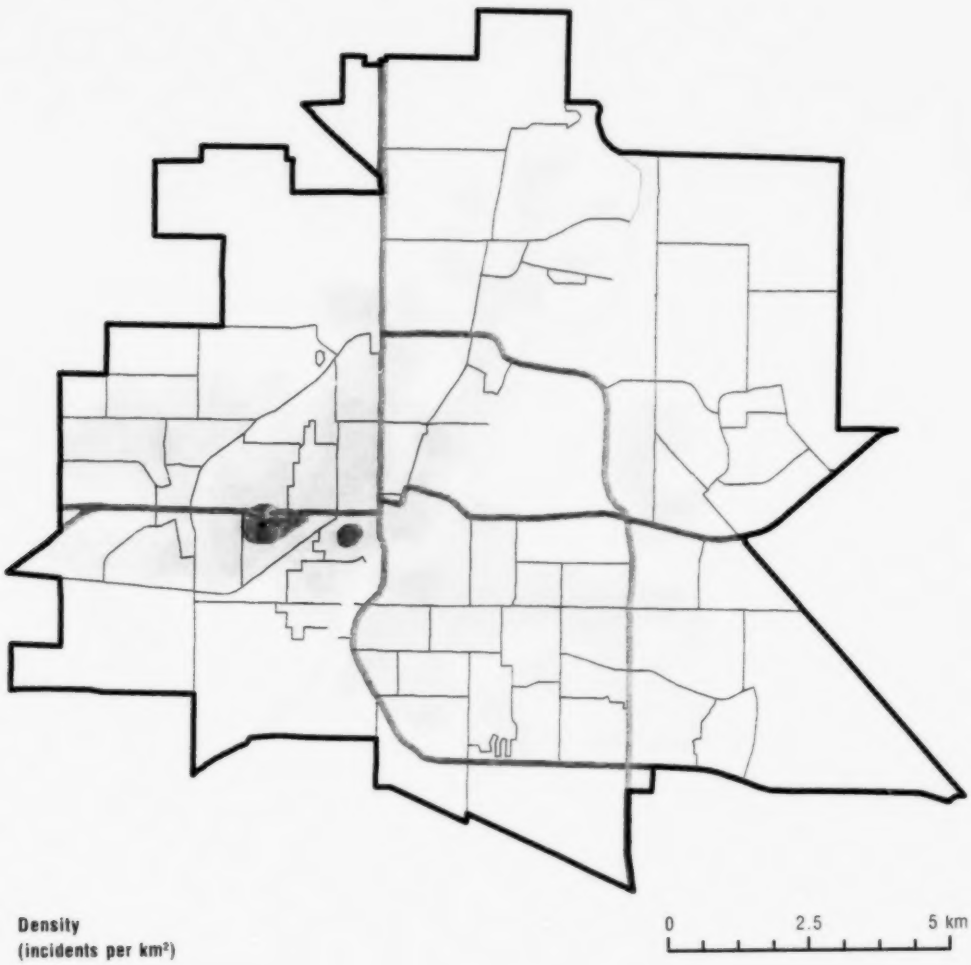
Based on 1,205 motor vehicle theft incidents.
Source: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, geocoded database, 2001.

Map 8
Density of police-reported mischief incidents, City of Saskatoon, 2001



Based on 3,967 mischief incidents.
Source: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, geocoded database, 2001.

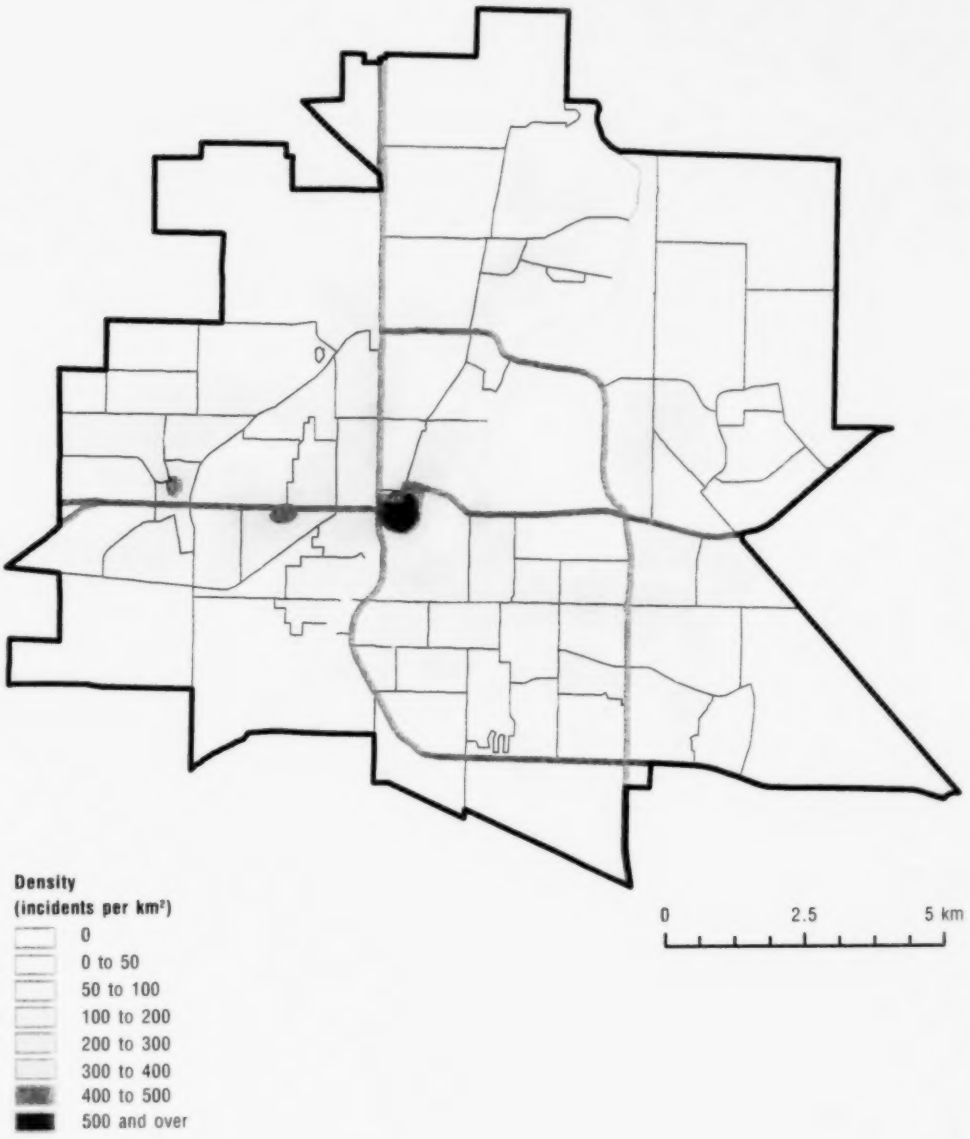
Map 9
Density of police-reported break and enter incidents, City of Saskatoon, 2001



Based on 3,896 break and enter incidents.
Source: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, geocoded database, 2001.

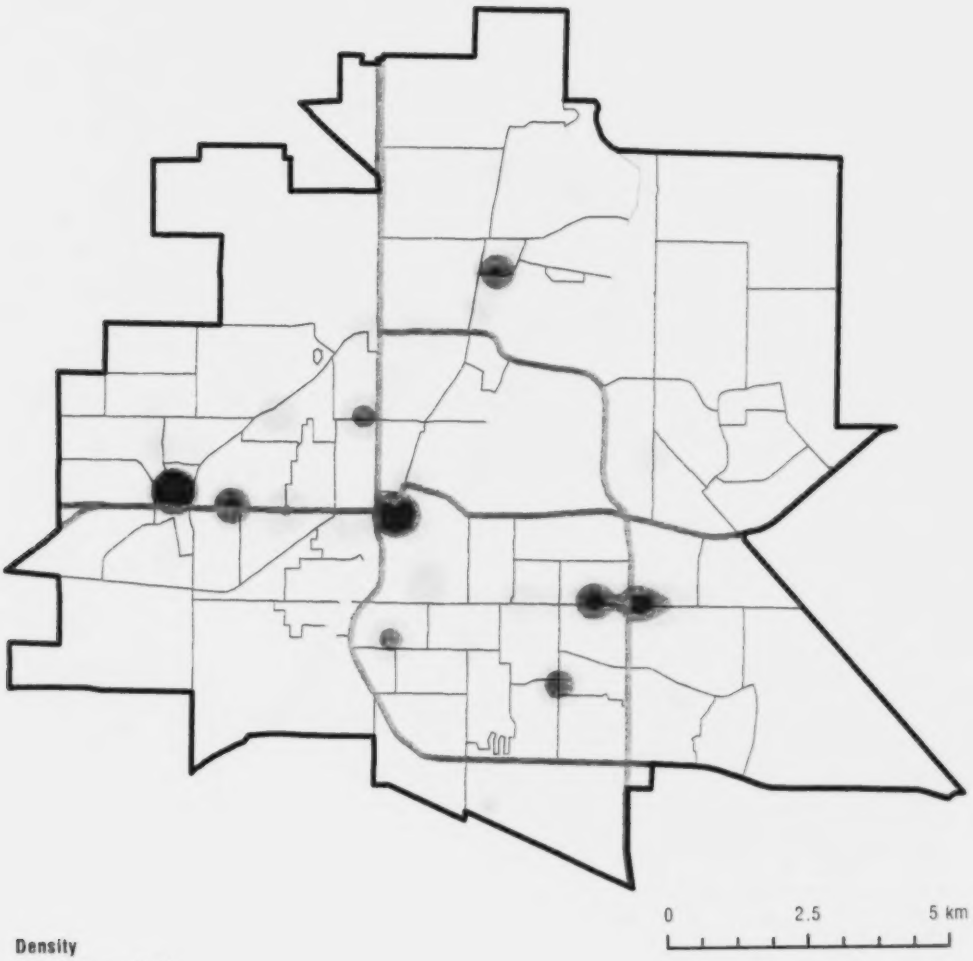
Map 10

Density of police-reported other theft incidents (excluding motor vehicle theft and shoplifting), City of Saskatoon, 2001



Based on 6,028 other theft incidents (excluding motor vehicle theft and shoplifting).
Source: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, geocoded database, 2001.

Map 11
Density of police-reported shoplifting incidents, City of Saskatoon, 2001



Based on 1,217 shoplifting incidents.
Source: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, geocoded database, 2001.

Western and eastern areas

The preceding maps show that there are more crimes reported west of the South Saskatchewan River than east of it. This contrast between the east and west sides was previously observed by Kitchen (2006) and acknowledged by several community representatives (Wilkie and Berdahl, 2007). The situation is explained in part by the spatial distribution of the population at risk. Although the number of residents on either side of the river was about equal, the western sector included 26,000 more workers than the eastern sector (Table 2).

Table 2

Count of police-reported crime incidents west and east of the South Saskatchewan River, City of Saskatoon, 2001

	City of Saskatoon	West	East	Ratio West/East[1]
	number	number	number	ratio
Population[2]				
Residents	193,660	96,605	97,055	1.00
Workers	109,535	67,810	41,725	1.63
Population at risk	303,195	164,415	138,780	1.18
Selected incidents	21,931	15,498	6,435	2.41
Total violent incidents[3]	3,681	2,931	750	3.91
Homicide[4,5]	5	5	0	...
All sexual offences[4,6]	189	145	44	3.30
Assault[4]	2,331	1,885	446	4.23
Roberry[4]	476	405	71	5.70
Total property crime[3]	17,327	11,832	5,495	2.15
Arson[4]	176	130	46	2.83
Break and enter[4]	3,896	2,814	1,082	2.60
Mischief[4]	3,967	2,575	1,392	1.85
Motor vehicle theft[4]	1,205	965	240	4.02
Shoplifting[4]	1,217	836	381	2.19
Other theft[4,7]	6,026	3,921	2,107	1.86
Total other incidents[3,8]	925	735	190	3.87
Prostitution[4]	44	42	2	21.00
Drug incidents[4]	445	339	106	3.20

... not applicable
0 true zero or a value rounded to zero
1. For all categories, counts of crime in the west are higher to those that would be observed if incidents where distributed in the same proportions as the population at risk (Chi-2, $p<0.001$).
2. The data are aggregated from the long form of the Census, based on a 20% sample of the Canadian population. They differ slightly from the data from the short form, completed by all households, and which are shown in Table 1.
3. Includes most serious violation in each incident only.
4. Includes all recorded violations in each incident.
5. Includes attempted murder and conspire to commit murder.
6. Includes sexual assault (levels 1 to 3) and other sexual violations.
7. Excludes incidents of motor vehicle theft and shoplifting.
8. Includes prostitution, offensive weapons, gaming and betting and other *Criminal Code* offences.

Sources: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, geocoded database 2001, and Census 2001.

Nevertheless, crimes are proportionality much higher in the city's western sector. In fact, the population at risk was 18% greater in the west, while there were 141% more crimes. There were more of all types of crimes in the city's western sector, with the ratio climbing from double the number of incidents of mischief to six-times the number of robberies.

The overall crime rate was twice as high west of the river (94 incidents per 1,000 residents and workers) as it was east of the river (46 incidents per 1,000 residents and workers). Violent crime incidents were especially over-represented, assaults and robberies in particular. In addition, all incidents of homicide and almost all incidents of prostitution were reported in the western sector.

In addition to the differences in the distribution of crime between the eastern and western sectors of the city, there are differences in the dwelling characteristics as well as in the socio-economic and demographic characteristics in the two areas. For example, neighbourhoods in the western sector contained a smaller proportion of dwellings built after 1990 and the percentage of dwellings requiring major repairs was higher. These characteristics are probably reflected in the fact that the average property value in the western area was more than $27,000 less (Table 3).

Table 3

Neighbourhood characteristics west and east of the South Saskatchewan River, City of Saskatoon, 2001

	City of Saskatoon	West	East
		percentage	
Dwellings characteristics[1]			
Dwellings built after 1990	8.6	4.4	12.7
Dwelling needing major repairs	5.9	7.1	4.8
		dollars	
Average value of dwellings	128,124	113,553	140,899
Population characteristics[1]		percentage	
Renters	31.4	34.9	27.9
Lone-parent families	13.0	15.8	10.2
Population without a high school diploma	30.7	37.3	24.4
Population with a university degree	19.6	12.8	26.2
Unemployment rate	7.2	8.3	6.1
		dollars	
Average employment income	37,290	33,895	40,406
		percentage	
Government transfers	11.8	14.2	10.0
Low income	19.7	23.5	15.9
Aboriginal peoples	9.8	14.6	5.1
		number	
Place of work characteristics[2]			
Construction, manufacturing, transportation and warehousing	18,020	14,580	3,440
Wholesale trade	5,585	4,485	1,100
Retail trade	14,050	8,830	5,220
Other services	27,290	17,380	9,910
Health care, social assistance and educational services	25,850	11,075	14,775
Public administration	6,250	3,820	2,430

1. For all showed variables, the distribution between west and east sectors is different than that of the total population (Chi-2, $p<0.001$).
2. The number of jobs was calculated by workplace.

Source: Statistics Canada, Census 2001.

In addition, a larger number of western sector residents were part of a lone-parent family, a low-income family or a household not occupied by the owner. They were also less likely to have obtained a university degree and more likely to have never finished high school. Furthermore, their economic situation was also less favourable: the unemployment rate there was higher and the average employment income was lower by $6,500. Also, the proportion of Aboriginal people was three times higher in the city's western area, where they made up 15% of the population.

The western area has many more jobs than the eastern part. The surplus is found mainly in manufacturing-type jobs (construction, manufacturing, transportation and warehousing), wholesale trade, public administration and other services, which, combined, accounted for 90% of the job discrepancy. Jobs in the retail trade, health care, social assistance and educational services sectors were more evenly distributed on both sides of the river.

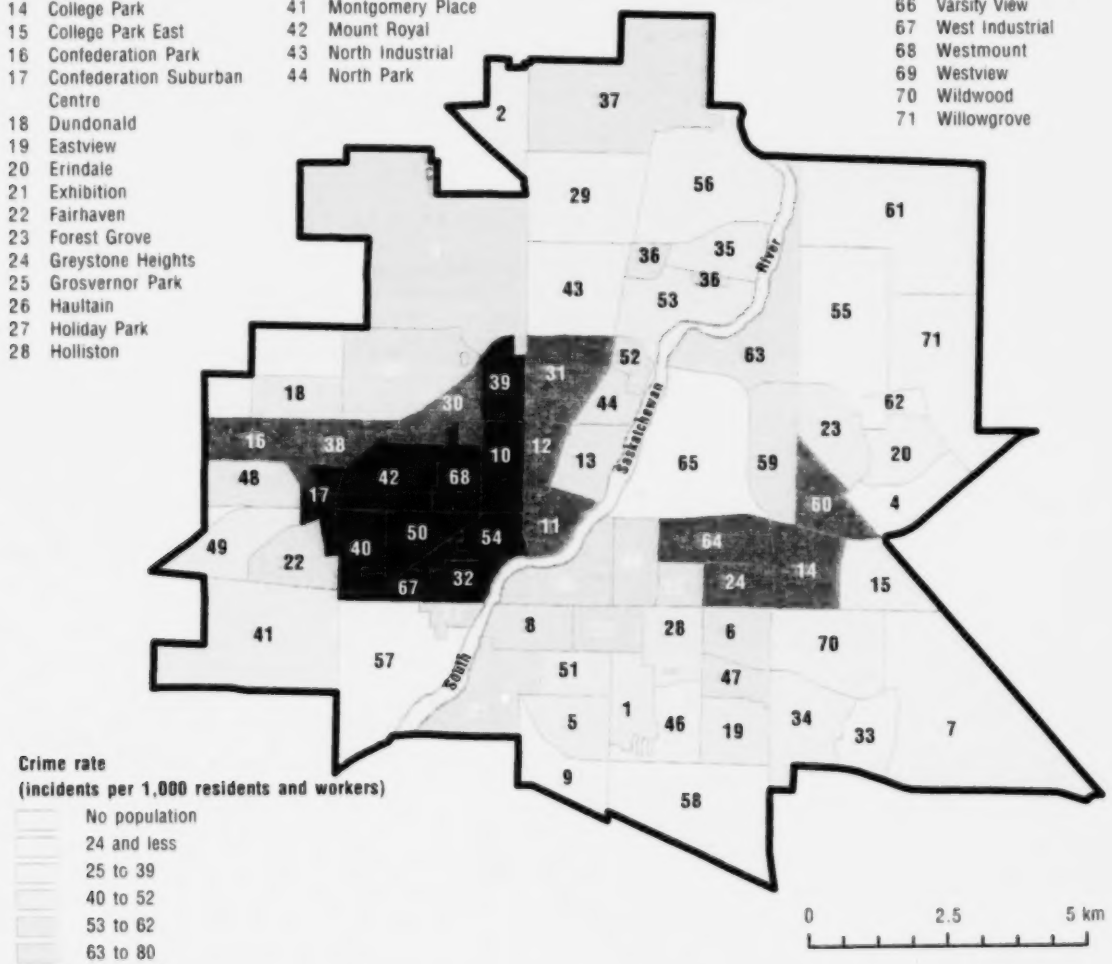
Neighbourhoods

The east/west discrepancies are still evident when neighbourhoods are compared. The ten neighbourhoods with the highest crime rates are all located west of the South Saskatchewan River (Map 12; see tables in Appendix A for complete data on all neighbourhoods).

Map 12

Crime rate (per 1,000 residents and workers), City of Saskatoon neighbourhoods, 2007

1 Adelaine - Churchill
2 Agriplace
3 Airport
4 Arbor Creek
5 Avalon
6 Brevoort Park
7 Briarwood
8 Buena Vista
9 C.N. Industrial
10 Caswell Hill
11 Central Business District
12 Central Industrial
13 City Park
14 College Park
15 College Park East
16 Confederation Park
17 Confederation Suburban Centre
18 Dundonald
19 Eastview
20 Erindale
21 Exhibition
22 Fairhaven
23 Forest Grove
24 Greystone Heights
25 Grosvernor Park
26 Haultain
27 Holiday Park
28 Holliston
29 Hudson Bay Industrial
30 Hudson Bay Park
31 Kelsey-Woodlawn
32 King George
33 Lakeridge
34 Lakeview
35 Lawson Heights
36 Lawson Heights Suburban Centre
37 Marquis Industrial
38 Massey Place
39 Mayfair
40 Meadowgreen
41 Montgomery Place
42 Mount Royal
43 North Industrial
44 North Park
45 Nutana
46 Nutana Park
47 Nutana Suburban Centre
48 Pacific Heights
49 Parkridge
50 Pleasant Hill
51 Queen Elizabeth
52 Richmond Heights
53 River Heights
54 Riversdale
55 Silverspring
56 Silverwood Heights
57 South West Industrial
58 Stonebridge
59 Sutherland
60 Sutherland Industrial
61 University Heights Development Area
62 University Heights Suburban Centre
63 University of Saskatchewan Lands - North
64 University of Saskatchewan Lands - South
65 University of Saskatchewan Management Area
66 Varsity View
67 West Industrial
68 Westmount
69 Westview
70 Wildwood
71 Willowgrove



Crime rate
(incidents per 1,000 residents and workers)

- No population
- 24 and less
- 25 to 39
- 40 to 52
- 53 to 62
- 63 to 80
- 81 to 110
- 111 to 302

Note: The neighbourhoods were recreated by aggregation of census blocks. In a few exceptional locations, the neighbourhood boundaries as defined by the blocklevel aggregation do not exactly correspond to the official boundaries.

Sources: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, geocoded database, 2001 and City of Saskatoon, Community Services Department, City Planning Branch, 2007.

Two of the neighbourhoods that recorded the highest crime rates are located immediately west of the Central business district.[7] Pleasant Hill and Riversdale were respectively second and third in terms of their crime rates, with close to 300 incidents per 1,000 residents and workers (Table 4). In 2001, almost one-quarter of the City of Saskatoon's violent incidents were reported in these two neighbourhoods, which also accounted for almost one-quarter of assaults, sexual offences or robberies and about one-seventh of incidents involving break and enter, motor vehicle theft or mischief.

Table 4

Count of police-reported crime incidents in selected high- and low-crime neighbourhoods, City of Saskatoon, 2001

	Confederation Suburban Centre	Pleasant Hill and Riversdale	Adjacent neighbour-hoods[1]	Central business district	Residential low-crime[2]	Industrial low-crime[3]	City of Saskatoon
				number			
Population[4]							
Residents	560	6,665	15,585	2,475	11,855	375	193,660
Workers	2,220	3,745	4,645	14,620	1,225	16,233	109,535
Population at risk	2,780	10,410	20,230	17,095	13,080	16,608	303,195
Selected incidents	836	2,954	3,207	1,695	250	283	21,931
Total violent incidents[5]	130	838	629	293	34	23	3,681
Homicide[6,7]	0	0	3	0	0	0	5
All sexual offences[6,8]	1	44	29	7	1	2	189
Assault[6]	75	581	416	163	14	16	2,331
Roberry[6]	27	115	111	54	3	0	476
Total property crime[5]	662	1,865	2,348	1,227	204	239	17,327
Arson[6]	1	36	29	6	0	2	176
Break and enter[6]	58	587	774	123	38	50	3,896
Mischief[6]	69	516	494	189	86	45	3,967
Motor vehicle theft[6]	65	166	272	56	7	11	1,205
Shoplifting[6]	271	36	100	202	0	3	1,217
Other theft[6,9]	207	504	714	512	78	135	6,028
Total other incidents[5,10]	21	194	128	106	6	9	925
Prostitution[6]	0	28	8	1	0	0	44
Drug incidents[6]	11	58	45	43	3	8	445

0 true zero or a value rounded to zero

1. Caswell Hill, King George, Meadowgreen, Mount Royal, West Industrial and Westmount.
2. Arbor Creek, Briarwood, Lakeridge, Stonebridge, University Heights Suburban Centre and Silverspring.
3. South West Industrial, C.N. Industrial and University of Saskatchewan Management Area.
4. The data are aggregated from the long form of the Census, based on a 20% sample of the Canadian population. They differ slightly from the data from the short form, completed by all households, and which are shown in Table 1.
5. Includes most serious violation in each incident only.
6. Includes all recorded violations in each incident.
7. Includes attempted murder and conspire to commit murder.
8. Includes sexual assault (levels 1 to 3) and other sexual violations.
9. Excludes incidents of motor vehicle theft and shoplifting.
10. Includes prostitution, offensive weapons, gaming and betting and other *Criminal Code* offences.

Sources: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, geocoded database 2001, and Census 2001.

These are older neighbourhoods where over half of the dwellings were built prior to 1961 and 15% required major repairs (Table 5). The average property value was considerably less than that for the municipality as a whole. These neighbourhoods are also characterized by the disadvantaged situation of their residents. Average employment income was $21,507 and government transfers made up 38% of the total income of residents. Over one-quarter of the labour force in Pleasant Hill and Riversdale was unemployed in 2001, 63% were part of a low-income family and 29% were part of a lone-parent family. Lastly, Aboriginal peoples make up close to half of the population.

Table 5

Characteristics of selected high- and low-crime neighbourhoods, City of Saskatoon, 2001

	Pleasant Hill and Riversdale	Adjacent neighbour-hoods[1]	Central business district	Residential low-crime[2]	City of Saskatoon
			percentage		
Crime rate	283	158	99	19	72
Dwellings built before 1961	51	57	19	0	26
Dwellings built after 1990	3	1	10	66	9
Dwellings needing major repairs	15	11	4	0	6
			dollars		
Average value of dwellings	74,636	89,154	145,983	192,476	128,124
			percentage		
Renters	71	40	82	2	31
Population aged 15 and under	28	21	1	27	20
Population aged 65 and over	10	12	54	5	12
Population living alone	17	14	57	3	12
Lone-parent families	29	22	3	5	13
Population without a high school diploma	58	45	43	20	31
Population with a university degree	7	8	21	28	20
Unemployment rate	26	12	10	4	7
			dollars		
Average employment income	21,507	26,723	37,418	54,156	37,290
			percentage		
Government transfers	38	22	28	4	12
Low income	63	33	29	3	20
Aboriginal peoples	47	21	7	3	10

0 true zero or a value rounded to zero

1. Caswell Hill, King George, Meadowgreen, Mount Royal, West Industrial and Westmount.
2. Arbor Creek, Briarwood, Lakeridge, Stonebridge, University Heights S.C. and Silverspring.

Note: Confederation Suburban Centre and 'industrial low-crime' neighborhoods do not figure at this table because they have less than 1,000 residents.

Sources: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, geocoded database 2001, and Census 2001.

The neighbourhoods adjacent to Riversdale or Pleasant Hill also have crime rates twice as high as the municipal average: Westmount, Mount Royal, West Industrial, Caswell Hill, King George and Meadowgreen. These neighbourhoods were also characterized by an unfavourable economic situation, although one that was less disadvantaged than the one observed in Riversdale and Pleasant Hill.

A little farther west, Confederation Suburban Centre had the highest crime rate of all neighbourhoods with 302 incidents per 1,000 residents and workers. This neighbourhood was mainly commercial (i.e., shopping centres). It ranked first in terms of the number of shoplifting incidents reported, with over one in five of all shoplifting incidents taking place in this neighbourhood. The neighbourhood also has higher crime rates than the municipal average for almost all types of crime.

With 1,695 incidents, the Central business district ranks second behind Pleasant Hill (1,904) in terms of reported incidents. However, this neighbourhood ranks first in terms of property crimes and, more specifically, incidents of theft (excluding motor vehicle thefts and shoplifting). In fact, 8.5% of incidents of theft were reported in that neighbourhood.

The Central business district neighbourhood is characterized by its economic function. In 2001, it had nearly six jobs for every resident within a relatively small geographic area. However, the downtown area is more favourable when it comes to its crime rate. With a crime rate of 99 incidents per 1,000 residents and workers, the Central business district ranked fifteenth among Saskatoon neighbourhoods.

Only six neighbourhoods with a crime rate higher than the city's average are located on the east side of the South Saskatchewan River. Three of them (Greystone Heights, College Park and Grosvenor Park) border the 8th Street commercial strip, while University of Saskatchewan – South Management Area is closely located to it. Nearly one-fifth of reported incidents included a shoplifting incident and close to a third of incidents included other thefts (excluding shoplifting and motor vehicle theft). The Sutherland Industrial neighbourhood had more than five jobs for one resident and 60% of the incidents that were reported within its boundaries included a break and enter or a theft (excluding shoplifting, motor vehicle theft and other theft). Finally, the crime rate in Nutana, which was slightly above Saskatoon's average, is probably explained by its centrality (it faces the downtown area).

The low crime neighbourhoods (those with fewer than 25 incidents per 1,000 residents and workers) are located in City of Saskatoon's outlying neighbourhoods, except for the University of Saskatchewan Management Area. It is worth noting that these neighbourhoods' official boundaries differ from the boundaries defined in this work. These neighbourhoods are not generally mixed functionally, i.e. they have either many workers and few residents or many residents and few workers.

The industrial neighbourhoods of South West Industrial, CN Industrial and the University of Saskatchewan Management Area fall into the first group (which includes many workers but few residents). The first two areas by themselves accounted for 12.6% of the manufacturing jobs, while the University of Saskatchewan Management Area included almost one-third of all jobs in the health care, social assistance and educational services sectors.

The Lakeridge, Silverspring, Briarwood, Stone bridge, University Heights S.C. and Arbor Creek neighbourhoods fall into the second group (which includes many residents but few workers). Residents of these neighbourhoods enjoy a favourable socio-economic situation. Over one quarter of their residents held an undergraduate degree and most of them were members of a household occupied by the owner. They had an average employment income 50% higher than that of the residents of the City of Saskatoon. In contrast, the proportion of Aboriginal persons,

people living alone, lone-parent families, members of low-income families, and the unemployment rate were significantly lower than elsewhere.

These were also relatively young neighbourhoods: 27% of their population was under the age of 15 years, while only 5% were 65 or older. None of their dwellings were built before 1961 and two-thirds were built after 1990. The average property value in these neighbourhoods was substantially higher.

Characteristics of the dissemination areas

Several earlier studies revealed that certain neighbourhood characteristics are statistically associated with crime (Fitzgerald et al. 2004; Savoie et al. 2006; Wallace et al. 2006; Kitchen 2006; Andresen and Brantingham 2007; Savoie 2008). In this section, we examine the statistical association between crime rates for different types of crime and certain neighbourhood characteristics.

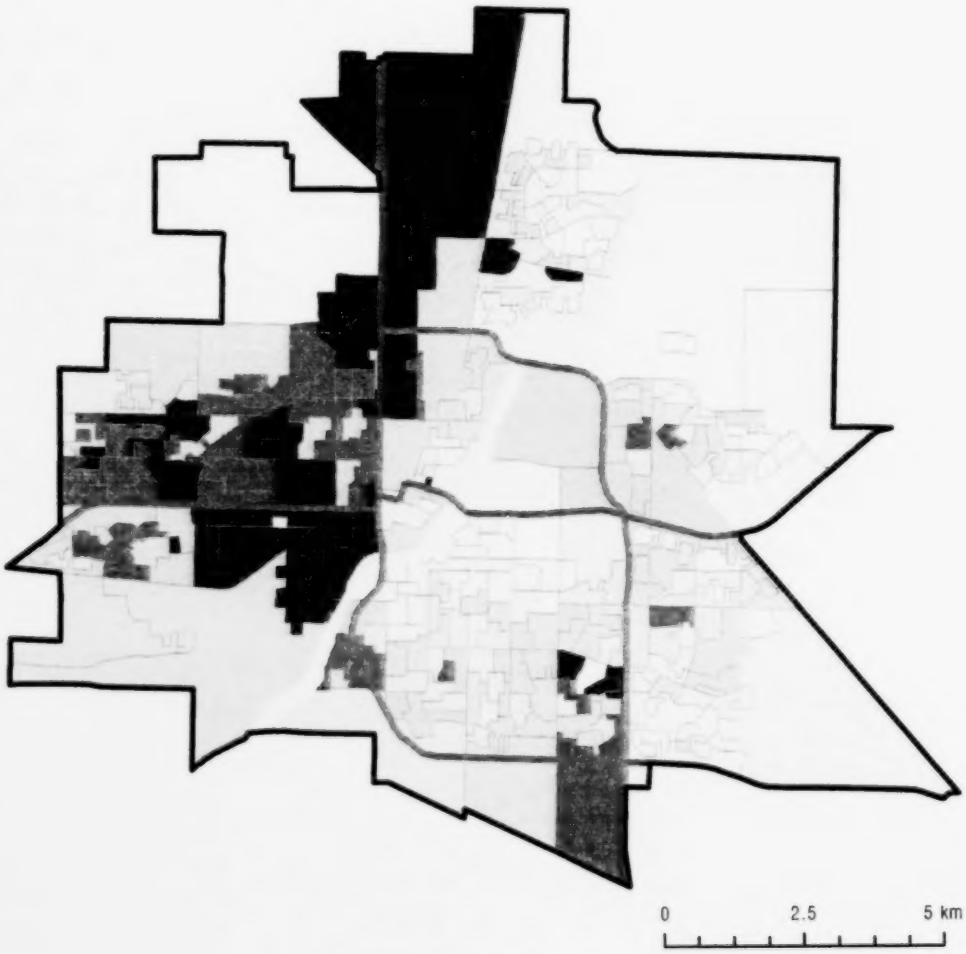
A factor analysis (see the Methodology section) was used to identify the characteristics that distinguish the various Saskatoon neighbourhoods. This process identified six dimensions of the differentiation of the Saskatoon dissemination areas (DAs). (The Methodology section contains details on the measurement, spatial organization and interpretation of these dimensions.)

The socio-economic disadvantage factor is a measure of variables associated with lower socio-economic means (see Table 8 in the Methodology section). For example, DAs with a high score on the socio-economic disadvantage factor were areas where the residential population had on average fewer years of schooling, and showed high proportions of Aboriginal peoples, lone-parent families and members of low-income families. Their dwellings had lower average values, their residents earned lower salaries and government transfers accounted for a larger proportion of their total incomes. Most of these DAs are found west and north of the downtown area (Map 13). Some authors have suggested that a lack of access to socio-economic resources inhibits the establishment of social networks that may permit informal social control of crime by the resident population (Forrest and Kearns 2001; Sampson et al. 2002). In addition, a lack of integration in the economic system and the resulting stigmatization has been hypothesized to undermine respect for the standards of behaviour endorsed by society in general (Massey 1996; Body-Gendrot 2001; Forrest and Kearns 2001; Bauder 2002; Sampson et al. 2002).

The aging dwellings factor is most strongly characterized by variables measuring aspects of the quality of dwellings in DAs, where a high score is representative of neighbourhoods with a high proportion of dwellings requiring major repairs, and a high proportion of older dwellings built before 1961, but few built after 1990. Other variables associated with a high score on this factor included high proportions of Aboriginal peoples and low-income families, lower average incomes, and a higher part of total income composed of government transfers. Neighbourhoods scoring high on this factor circle the downtown area (Map 14). The "broken window" theory argues that degradation of the physical environment fosters crime (Kelling and Coles 1998).

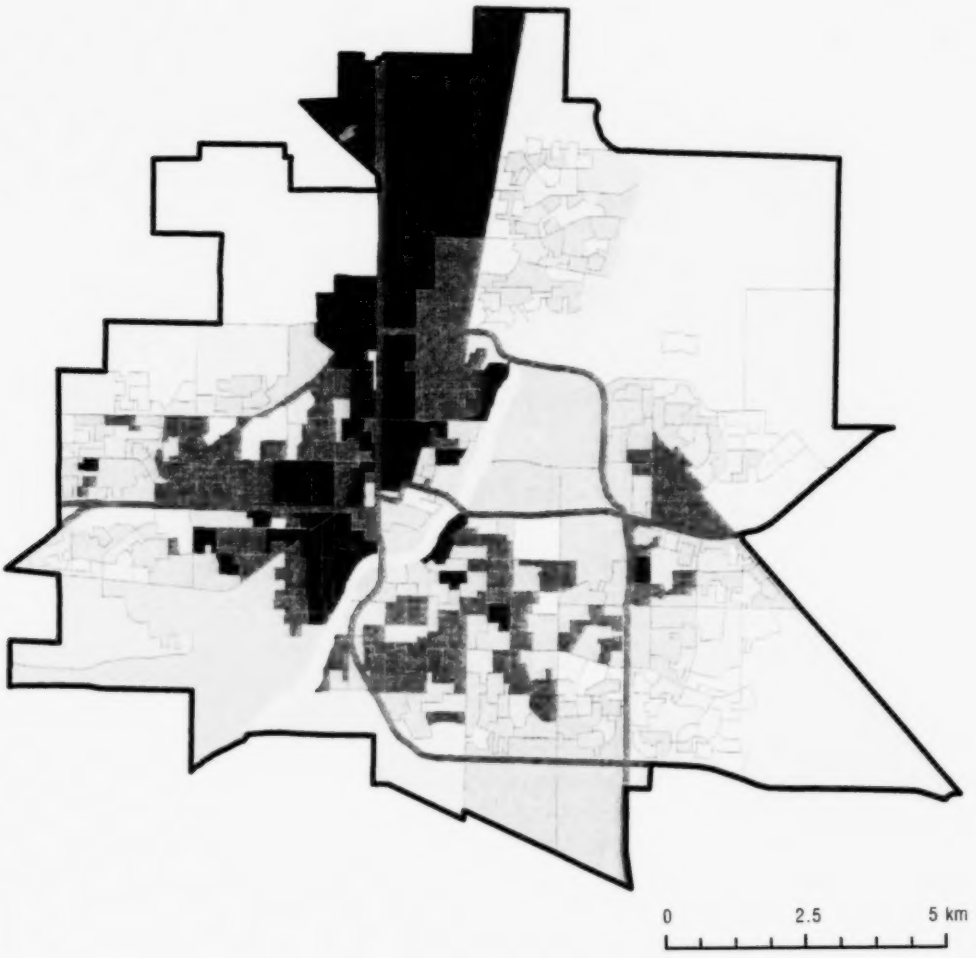
Catalogue no. 85-561-MIE No. 012

Map 13
Socio-economic disadvantage, City of Saskatoon, 2001



Source: Statistics Canada, Census, 2001.

Map 14
Aging dwellings, City of Saskatoon, 2001



Source: Statistics Canada, Census, 2001.

The residential mobility factor captured the frequency of moving by residents. DAs with a high score on this factor are characterized by higher proportions of residents who did not live at the same address the year before the Census was conducted, dwellings with fewer rooms, high proportions of renters, low-income families and people living alone and residents who did not used a car to get to work but by lower proportions of residents who had lived at the same address for over five years. Although most of these DAs are closer to the city's core, some of them are in the outlying areas (Map 15). By compromising the development of strong social networks or social cohesion in neighbourhoods (Sampson and Morenoff 2004) and attachment to the neighbourhood, these characteristics have been hypothesized to foster crime (Pain 2000; Brown et al. 2004).

The young population factor was dominated by variables related to the age structure of the neighbourhood. A high score on this factor was characterized by DAs with higher proportions of people aged less than 15 years, and lower proportions of older Canadians aged 65 years and over and people living alone. On an individual-level, the link between age and police-reported crime has been well established in the literature (Piquero, et al., 2003; Matarazzo 2005). Most of the DAs characterized by a young age structure were located near the periphery of the city (Map 16).

Ethno-cultural diversity is characterized by high proportions of recent immigrants (arriving after 1990) and members of visible minority groups. In Saskatoon, the DAs with a high score on this factor, which are highly diversified, are spread throughout the municipality, in the core and on the outskirts, in the east and in the west (Map 17). Cultural diversity is often accompanied by a diversity of norms, values and languages, which can negatively impact community social networks, and consequently, increase neighbourhood crime levels (Elliot et al. 1996). Members of visible minority groups are more likely to be victims of a hate crime (Silver et al., 2004).

The commercial activity factor is characterized by neighbourhoods where there is a high density of workers in the retail trade, accommodation and food services industries. Saskatoon's commercial activity is mainly concentrated in a few shopping complexes (Confederation Centre, The Mall at Lawson Height, etc.), on a few commercial roads (8th, 20th and 22nd Streets) and in the downtown area (Map 18). According to the routine activity theory (Cohen and Felson 1979), a concentration of commercial activity may foster crime to the extent that it brings together in the same place a number of opportunities for crime.

Text box 3

Factor analysis

The purpose of factor analysis is to reveal the latent characteristics (those that are not directly measured) using the variables to which they are linked. In urban geography, this approach has produced extensive literature on the differentiation of neighbourhoods based on census data (Davies and Murdie, 1993; Wyly, 1998). This work revealed that city neighbourhoods can be distinguished based on several dimensions, notably, socio-economic status, age and the ethno-cultural diversity of their residents.

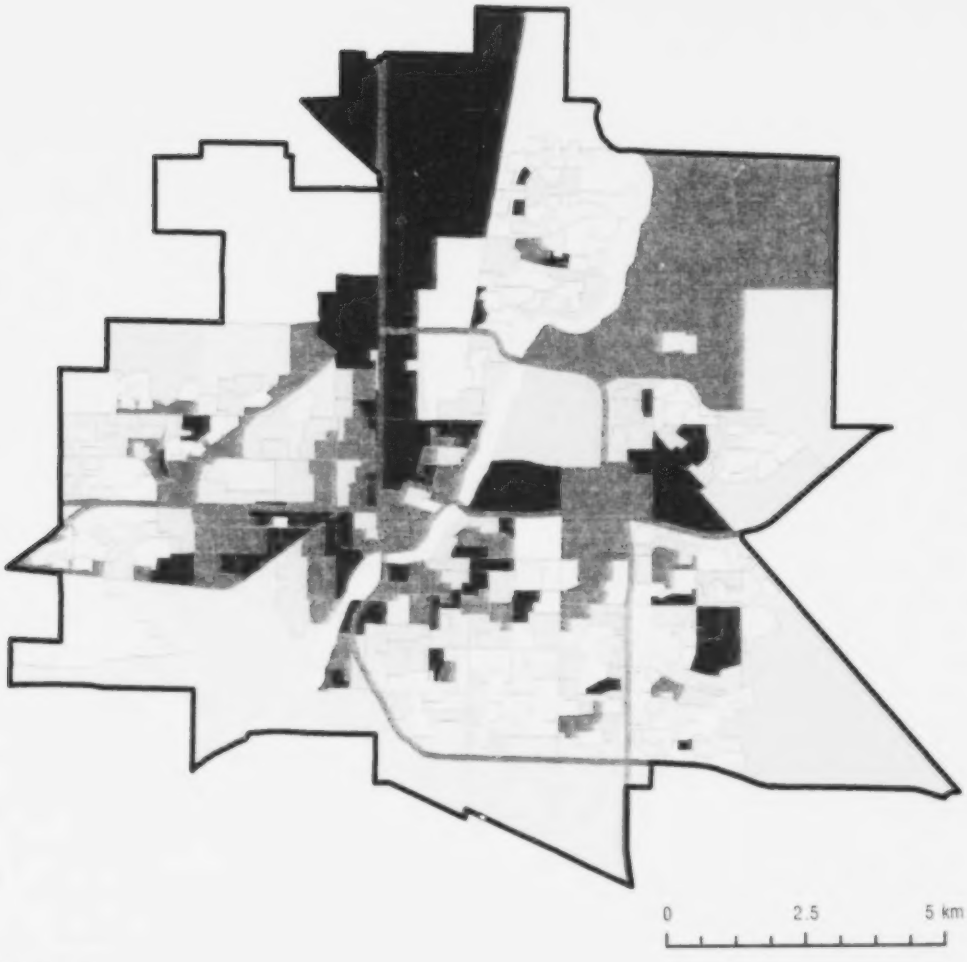
In factor analysis, variables that are closely correlated help define certain factors. For example, as part of this work, 23 variables contributed to defining six factors. These contributions made it possible to determine the importance of each factor in a DA by calculating the factor score. In the current study, the factor score becomes the characteristic of the neighbourhood that will be analysed statistically.

There are several benefits to this approach. First, it reduces the information to be analysed by shifting from 23 variables to six factors. In this way, factor analysis makes it possible to clarify interpretation of the results by eliminating certain redundant elements.

Second, by defining distinct factors, this method overcomes the problem of multi-collinearity. There is only a weak correlation between the factors themselves.

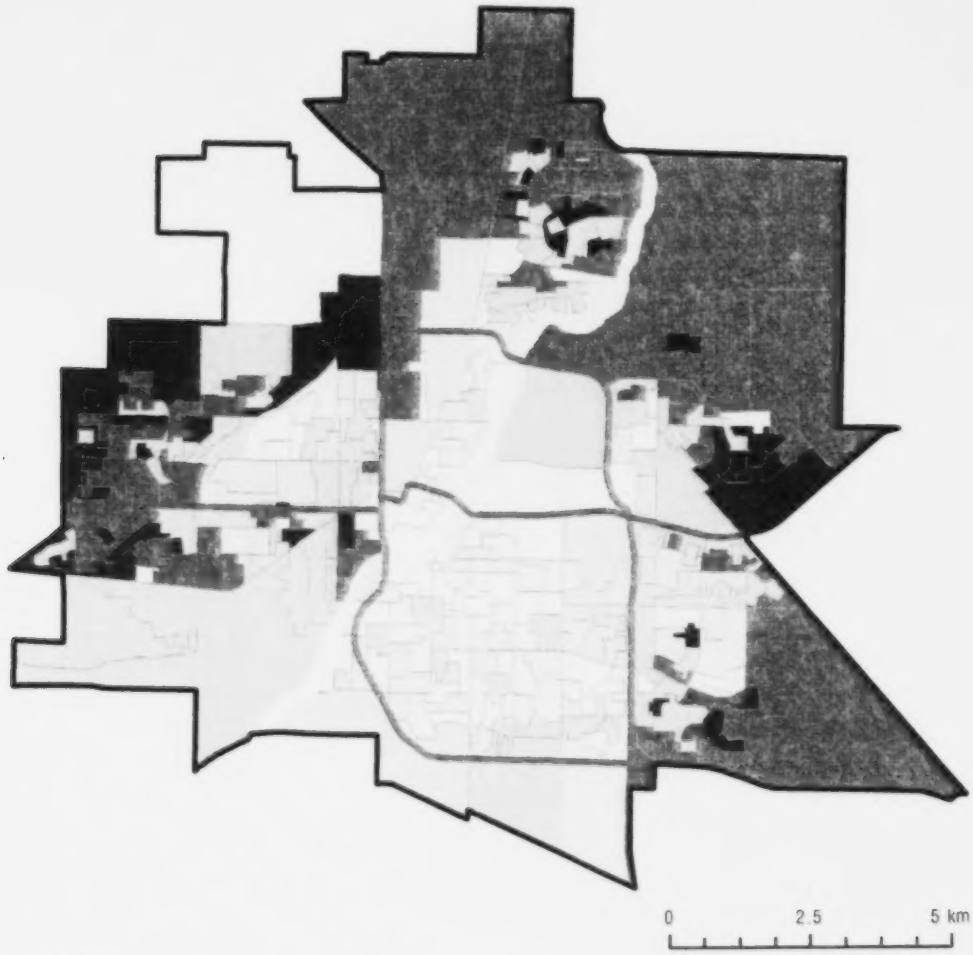
Lastly, factor analysis is a method especially well suited to the ecological approach behind this work, for the most part, census variables relate directly to the population of the DAs and not to the characteristics of the environment. Factor analysis identifies and measures the environmental characteristics assumed to influence crime rates.

Map 15
Residential mobility, City of Saskatoon, 2001



Source: Statistics Canada, Census, 2001.

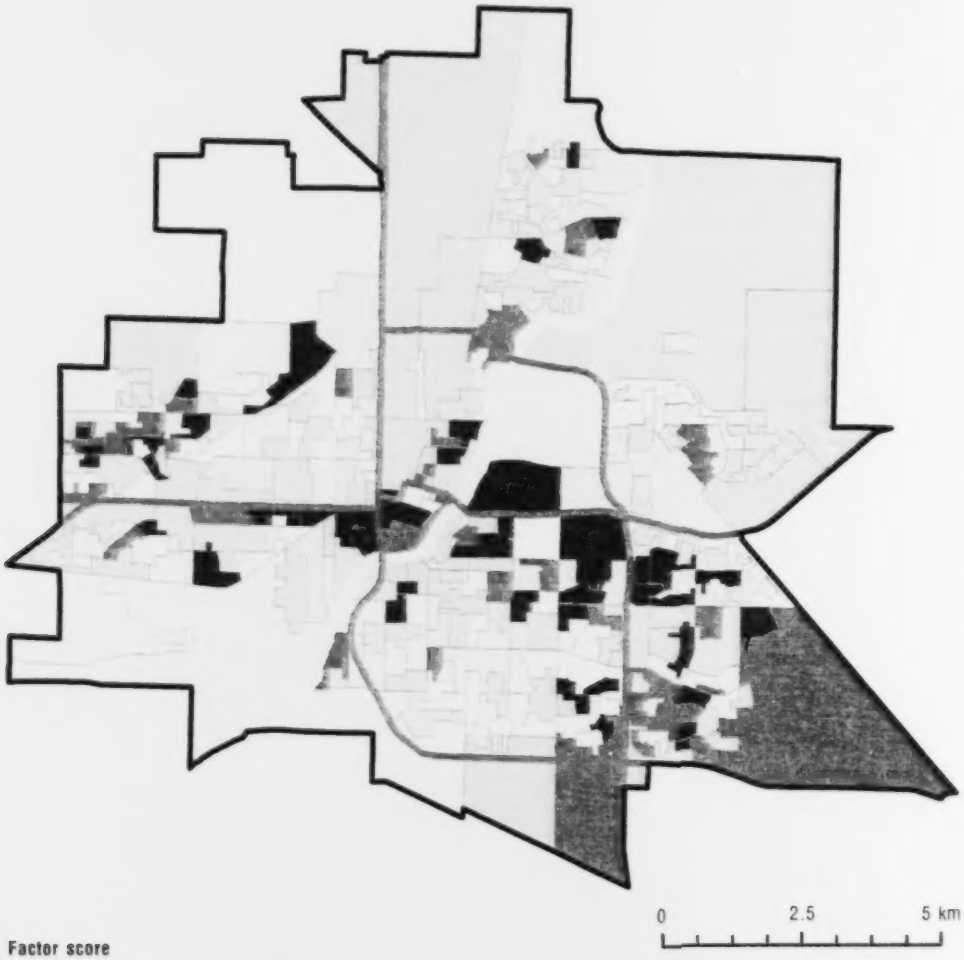
Map 16
Young population, City of Saskatoon, 2001



Source: Statistics Canada, Census, 2001

Map 17

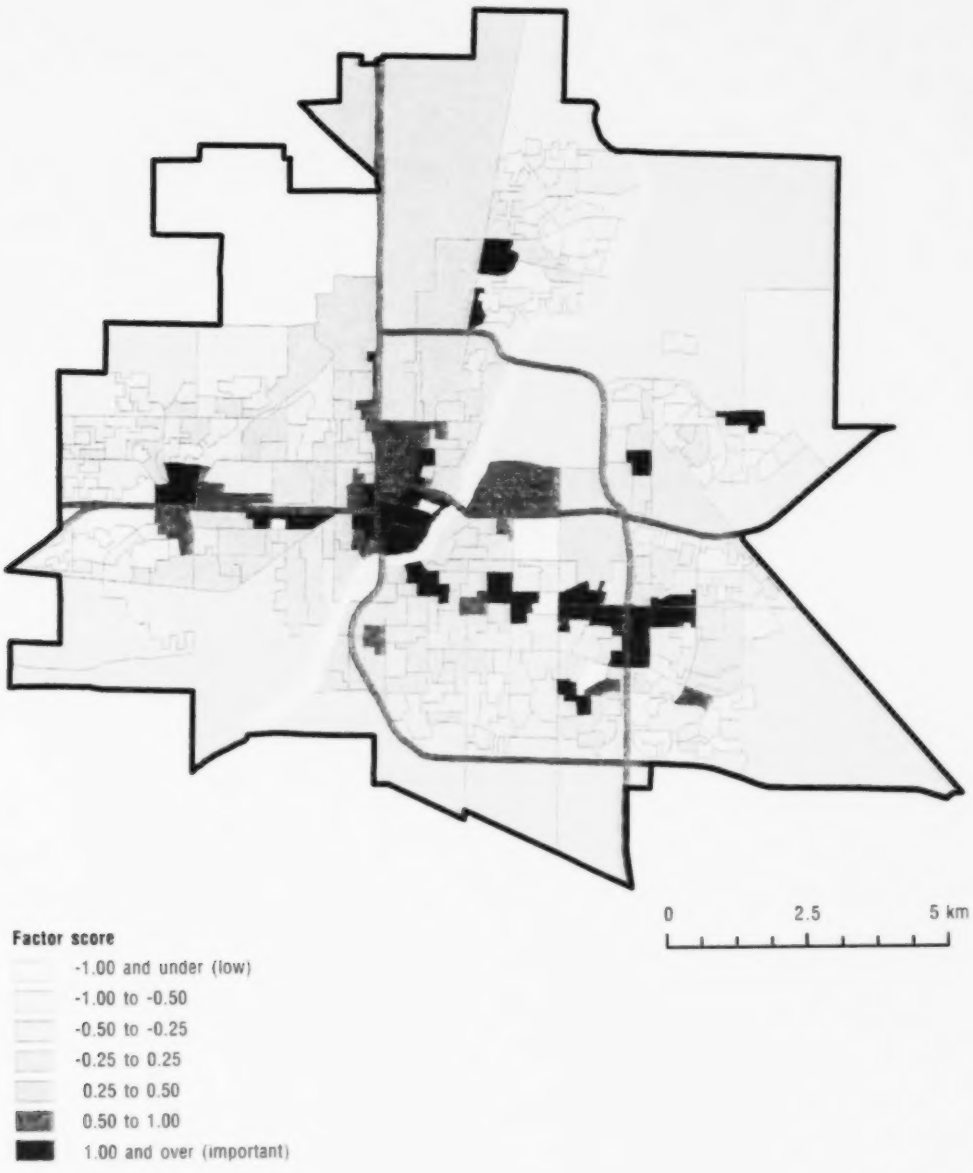
Ethno-cultural diversity,[1] City of Saskatoon, 2001



1. In this study, ethno-cultural diversity is associated solely with the strong presence of recent immigrants and members of a visible minority.

Source: Statistics Canada, Census, 2001.

Map 18
Commercial activity, City of Saskatoon, 2001



Source: Statistics Canada, Census, 2001.

Neighbourhood characteristics and crime

Within the context of this study, the six factors revealed by the factor analysis are regarded as the "atmosphere" that the residents and other users (people coming there to work, to shop, for example) of the neighbourhood experience. The statistical association between these environmental characteristics and crime rates is analysed below.

The results show that all neighbourhood characteristics, except ethno-cultural diversity, are significantly associated to violent and property crime rates (Table 6). Moreover, socio-economic disadvantage seems to play a more important role for violent crime while aging dwellings and commercial activity are more strongly associated with property crime rates.

Table 6

Regression models for selected crime rates, Saskatoon dissemination areas (DAs), 2001

	Violent crime incidents	Property crime incidents	Assault	Motor vehicle theft	Break and enter	Mischief	Other theft[1]	Shop-lifting
				number				
Count of incidents	3,681	17,327	2,273	1,179	3,845	3,913	5,884	1,206
				regression coefficients (b)				
Explanatary power[2]	0.64	0.57	0.64	0.49	0.56	0.36	0.41	0.27
Socio-economic disadvantage	0.57***	0.38**	0.56***	0.29***	0.17*	0.30***	...	...
Aging dwellings	0.31***	0.72***	0.28***	0.20**	0.48***	0.33***	0.45***	...
Residential mobility	0.30***	0.27*	0.28***	0.24***	0.18*	0.16*	0.30***	...
Young population	0.35***	0.39***	0.32***	0.11*	0.23***	0.22**	...	...
Ethno-cultural diversity	...	...	...	...	...	...	...	...
Commercial activity	0.31***	0.56***	0.27***	...	...	...	0.25**	0.77***
Contiguous DAs (spatial lag)	0.44***	0.44***	0.40***	0.39***	0.54***	0.33***	0.36***	...

... not applicable (variables excluded from the model because non significant (p>0.05))

* p<0.05

** p<0.01

*** p<0.001

1. Excludes incidents of motor vehicle theft and shoplifting.
2. For the shoplifting rate model, the coefficient of determination (r^2) is showed. Since other models are autoregressive, square correlation coefficients are showed. See "Spatial autocorrelation" in the Methodology section for more details on autoregressive spatial models.

Notes: Based on 328 DAs. Regression models include intercept.

Sources: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, geocoded database 2001, and Census 2001.

When specific crime types are examined, different characteristics explain the incident rates. Indeed, socio-economic disadvantage correlates to higher rates of assault and motor vehicle theft, commercial activity correlates more to incidents of shoplifting, and aging dwellings produces higher rates of break and enter, mischief and theft (excluding motor vehicle theft and shoplifting).

In fact, there appear to be four environmental characteristics that have a significant impact on the incident rate of assault, motor vehicle theft, break and enter, and mischief. In addition to socio-economic disadvantage and aging dwellings, residential mobility and young population are significantly associated with crime rates. This means that DAs with low socio-economic status, high residential mobility and consisting of many dwellings in poor condition and a young population, display higher rates of crime.

These crime rates are also associated to crime rates observed in adjacent DAs. In other words, DAs with high crime rates tend to be surrounded by other DAs with high crime rates. This statistical association can be interpreted several ways. From a technical perspective, it may be due to the boundaries of the geographic units used. From a social perspective, it may be the result of the spatial dissemination process, crime in one DA rubbing off on that of its neighbours (Anselin and Bera 1998).

Commercial activity is significantly associated with incident rates of assault, theft (excluding motor vehicle theft and shoplifting), and in particular, with shoplifting. The latter observation is due to the fact that shoplifting is necessarily associated with commercial activity. As for assaults and other thefts, it could be argued that commercial activity, by bringing many people together in the same place, leads to social interactions among individuals and, eventually, to certain types of crime.

Lastly, it should be noted that no statistically significant association was found between the ethno-cultural diversity factor and the police-reported crime rates.

Discussion and future directions

With more than one crime per ten residents, the City of Saskatoon had one of the highest crime rates in the country in 2001. The spatial analysis of these crimes revealed that they were heavily concentrated in the western part of the city. More specifically, over one-fifth of the crimes reported occurred in the Central business district or in the adjacent neighbourhoods of Pleasant Hill and Riversdale. In contrast, very few crimes were reported in outlying neighbourhoods.

The multivariate analysis of the characteristics of the DAs revealed that the neighbourhood characteristics that influence crime rates varied depending on the type of crime. Commercial activity appears to attract incidents of assault, other thefts and, in particular, shoplifting. Neighbourhoods such as Confederation Suburban Centre (a shopping area who showed the highest crime rate in the city) or Greystone Heights (close to businesses on 8th Street) are examples of this type of environment.

However, hotspots for this type of crime are relatively small in terms of their geographic area and can only be indirectly evaluated at the neighbourhood level. They tend to be somewhat spread out across the whole of the municipality and correspond to commercial streets, shopping centres or big box stores.

Analyses also showed that socio-economic disadvantage, aging dwellings, residential mobility and a young population structure were all associated with incidents of assault, motor vehicle theft, break and enter and mischief. The Riversdale and Pleasant Hill neighbourhoods, where higher levels of all of these characteristics were found, represented the city's highest crime neighbourhoods.

The hotspots for these types of crimes (with the exception of commercial hotspots) cover numerous contiguous DAs, grouped in the central neighbourhoods west of the South Saskatchewan River. In contrast, dwellings in the outlying neighbourhoods tended to be in better condition (among other reasons because the real estate is newer), their populations tended to be more advantaged (more educated and better paid), and stable (they move less often). Thus, the neighbourhoods of Lakeridge, Silverspring, Briarwood and Arbor Creek had among the lowest crime rates in the city.

Results from this study vary slightly from those of Kitchen (2006), who noted a "strong relationship" between violent crimes and Aboriginal peoples. In fact, results from a factor analysis in this study revealed that the proportion of Aboriginal peoples in the residential population was not **the** defining characteristic of any of the factors describing neighbourhoods in Saskatoon (See Factor analysis results in the Methodology section). Rather, the results suggest that Aboriginal peoples tend to live in neighbourhoods—characterized by greater proportions of aging dwellings, socio-economic disadvantage and residential instability of their residents—which are themselves strongly associated with crime. These results are consistent with

those of Fitzgerald and Carrington (forthcoming), according to which a significant part of the Aboriginal high crime rate reported by the police might be explained by the structural characteristics of the neighbourhoods where Aboriginal peoples tend to live.

The same comment can be made about ethno-cultural diversity; despite the fact that it was a factor that differentiated residential neighbourhoods, no statistically significant association was observed between crime rates and ethno-cultural diversity. Despite the fact that ethno-cultural diversity was a factor that differentiated Saskatoon's neighbourhoods, no significant association was observed between crime rates and ethno-cultural diversity. These results are consistent with other studies carried out in other Canadian cities (Fitzgerald et al. 2004; Savoie et al. 2006; Wallace et al. 2006; Kitchen, 2006; Andresen and Brantingham, 2007; Savoie 2008).

It is important to keep in mind that this report does not look at the individual characteristics of perpetrators or victims of crime, but rather at the environmental characteristics of the neighbourhoods. As such, factors including the proportion of Aboriginal peoples and ethno-cultural diversity are understood as environmental characteristics of neighbourhoods. No link can be made between neighbourhood crime rates and the behaviour of the people who live there.

The results in this study are consistent with the bivariate analysis of other research indicating that within Canadian cities, police-reported crime rates tend to be higher in regions where there is a concentration of factors such as low socio-economic resources, increased residential mobility and aging dwellings (Fitzgerald et al. 2004; Savoie et al. 2006; Wallace et al. 2006; Kitchen, 2006; Andresen and Brantingham, 2007; Savoie 2008).[8] This type of research evidence is in line with the intervention strategies focussing on improving living conditions of residents of high-crime neighbourhoods and integrating these residents into the socio-economic system. Interventions of this nature were suggested for the Pleasant Hill neighbourhood in a neighbourhood safety report (City of Saskatoon 2005).

In future studies, it would be instructive to expand the investigation to the issue of the changing patterns of crime and neighbourhood characteristics over time. An analysis of the evolution of neighbourhood characteristics and crime could provide a better understanding of the effect of various intervention strategies on the reduction of crime.

Furthermore, this type of research could respond to questions about the influence of demographic and economic shifts on crime rates in urban areas. For example, it would be possible to assess whether the degradation of certain environmental conditions in neighbourhoods always precede an increase in crime. Alternatively, it would also be possible to assess whether an increase in crime can lead to the degradation of environmental conditions in those neighbourhoods.

Methodology

Factor analysis results

The factor analysis was produced using SPSS software. It was preferred over the principal components analysis in order to reveal latent factors (Costello and Osborne 2005). Since certain variables did not have normal distributions, the selected extraction method was that of the principal axis factors. Lastly, direct oblimin rotation was applied to clarify the factor structure while allowing the factors to be partially correlated, which corresponds more closely to the phenomena observed in the social sciences (ibid.).

In this study, 23 census variables were chosen for the factor analysis. The purpose of this selection process was to avoid redundancy of information between variables and to represent the main environmental characteristics identified by previous work for their association with crime (Fitzgerald et al. 2004; Savoie et al. 2006; Wallace et al. 2006; Kitchen 2006; Andresen and Brantingham 2007; Savoie 2008).

Six factors were identified. They were, in the order of extraction, residential mobility, young population, ethno-cultural diversity, socio-economic disadvantage, aging dwellings and commercial activity. It should be noted that the order of extraction depends on the variance of the entire data set and not on the importance of one factor in the differentiation of the DAs or the statistical association with crime rates.

The results show that inequalities in income (measured by such variables as property value, proportion of low-income families or median personal income) do not constitute a specific dimension of the residential space in Saskatoon. Indeed, these inequalities have many facets that are represented in this study by three distinct factors: residential mobility, socio-economic disadvantage and aging dwellings. In Saskatoon, the same comment holds true for the proportion of Aboriginal peoples in a DA: it is higher in neighbourhoods with a high socio-economic disadvantage, residential mobility and a high proportion of aging dwellings.

Despite relatively weak coefficients, there is significant correlation between the factors for the most part (Table 7). These correlations are evidence of the specificity of each of the factors, as well as of their interdependence.

Table 7
Pearson's correlation coefficient of factors, City of Saskatoon, 2001

	Residential mobility	Young population	Ethno-cultural diversity	Socio-economic disadvantage	Aging dwellings
Young population	0.19***	...	...	...	...
Ethno-cultural diversity	0.18**	-0.02	...	...	...
Socio-economic disadvantage	0.41***	0.01	-0.07	...	...
Aging dwellings	0.38***	0.11*	-0.01	0.43***	...
Commercial activity	0.40***	0.40***	0.30***	0.18**	0.14**

... not applicable
* $p<0.05$
** $p<0.01$
*** $p<0.001$
Source: Statistics Canada, Census 2001.

The relative contribution of the variables to the factors is displayed in Table 8. Note that the higher the absolute value, the stronger the contribution. Therefore, a high negative value means there is a strong contribution, just as there is with a high positive value. In addition, high opposing values means that there are contrasts within a factor. For example, DAs with high residential mobility show high proportions of renters but low proportions of persons who had not changed their address since the last 5 years and vice versa. Lastly, the direction (+/-) of the contribution has only a relative meaning, that is, a negative value as opposed to a positive value.

Table 8
Contribution to factors matrix, City of Saskatoon, 2001

	Residential mobility	Young population[1]	Ethno-cultural diversity	Socio-economic disadvantage	Aging dwellings	Commercial activity
Dwellings built before 1961	0.34	-0.35	-0.11	0.19	0.56	0.21
Dwellings built after 1990	0.05	-0.05	0.02	-0.11	-0.50	0.06
Dwellings needing major repairs	0.43	-0.08	0.03	0.34	0.63	0.19
Rooms per dwelling	-0.83	0.53	-0.13	-0.43	-0.28	-0.53
Average value of dwellings	-0.45	0.00	0.12	-0.67	-0.42	-0.12
Renters	0.86	-0.[illegible]	0.15	0.43	0.44	0.41
Population aged 15 years and under	-0.23	0.81	-0.03	0.17	-0.09	-0.31
Population aged 65 and over	0.08	-0.86	-0.05	0.19	0.06	0.33
Population living alone	0.59	-0.66	0.03	0.25	0.37	0.42
Lone-parent families	0.42	0.27	-0.04	0.51	0.39	0.03
Movers (1 year)	0.83	-0.11	0.16	0.29	0.24	0.26
Stayers (5 years)	-0.88	0.11	-0.20	-0.27	-0.08	-0.38
Automobile to work	-0.57	0.42	-0.20	-0.20	-0.46	-0.53
Average years of schooling	-0.21	-0.04	0.09	-0.88	-0.15	-0.10
Unemployment rate	0.48	-0.01	0.19	0.43	0.44	0.20
Median employment income	-0.64	0.30	-0.14	-0.54	-0.54	-0.35
Government transfers	0.53	-0.45	-0.02	0.82	0.51	0.37
Low income	0.80	-0.18	0.20	0.59	0.58	0.30
Aboriginal peoples	0.56	0.23	-0.02	0.66	0.51	0.16
Recent immigrants	0.17	-0.10	0.76	-0.08	0.03	0.21
Visible minority	0.06	0.11	0.74	-0.03	-0.05	0.17
Density of workers in retail trade	0.16	-0.23	0.23	0.05	0.03	0.76
Density of workers in accomodation and food services	0.22	-0.18	0.16	0.10	0.04	0.75

0 true zero or a value rounded to zero
1. The values of the factors scores were reversed so that the association between the crime incident rate and the factor score was positive.
Source: Statistics Canada, Census 2001.

Data sources

Incident-based Uniform Crime Reporting Survey

The Incident-based Uniform Crime Reporting Survey (UCR2) collects detailed information on individual criminal incidents reported to the police, including characteristics of incidents, accused people and victims.

The UCR2 Survey allows a maximum of four offences per criminal incident to be recorded in the database. The selected offences are classified according to their level of seriousness, which is related to the maximum sentence that can be imposed under the *Criminal Code*.

Analyses of major offence categories (violent offences, property offences, other offences) undertaken in this report are based on the most serious offence in each incident, as are the crime rates published annually by the Canadian Centre for Justice Statistics (CCJS). In this type of classification, a higher priority is given to violent offences than to non-violent offences. As a result, less serious offences may be under-represented when only the most serious offence is considered.

When the analysis is focused on individual offence types, all incidents in which the offence is reported are included, whatever the seriousness or the ranking of the offence in the incident. In this study, incidents with assault, motor vehicle theft, break and enter, mischief, other theft and shoplifting are calculated that way. This method provides a more complete spatial representation of the different types of individual offences.

This report includes most *Criminal Code* offences and all offences under the *Controlled Drug and Substances Act*, but it excludes offences under other federal and provincial statutes and municipal by-laws. Also excluded are *Criminal Code* offences for which there is either no expected pattern of spatial distribution or a lack of information about the actual location of the offence. For example, administrative offences including bail violations, failure to appear and breaches of probation are typically reported at court locations; threatening or harassing phone calls are often reported at the receiving end of the call; and impaired driving offences may be more likely to be related to the location of apprehension (for example, apprehensions resulting from roadside stop programs).

Violent incidents include murder, attempted murder, sexual assault, assault, violation resulting in the privation of freedom, robbery, extortion, criminal harassment, utter threats to person, explosives causing death/bodily harm and other violations against the person.

Property incidents include arson, break and enter, theft over $5,000, theft $5,000 and under, motor vehicle theft, have stolen goods, fraud and mischief.

Census of population

The Census of Population provides the population and dwelling counts not only for Canada but also for each province and territory, and for smaller geographic units, such as cities or districts within cities. The census also provides information about Canada's demographic, social and economic characteristics.

The detailed socio-economic data used in this report are derived from the long form of the census, which is completed by a 20% sample of households.

The Census of Population is conducted by Statistics Canada every five years, most recently in 2006. To achieve the highest degree of compatibility between neighbourhood characteristics derived from the census and crime information, this report draws on police data from 2001 and census data from the same year. When the Saskatoon study was conducted, detailed data from the 2006 Census on population characteristics, in particular on individuals' income, were not yet available at the neighbourhood level.

Definition of variables

Dwellings built before 1961
: Percentage of dwellings built before 1961.

Dwellings built after 1990
: Percentage of dwellings built after 1990.

Dwellings needing major repairs
: Percentage of dwellings needing major repairs (plumbing or electrical wiring, structural repairs to walls, floors or ceilings, etc.).

Rooms per dwelling
: Average number of rooms per dwelling.

Average value of dwellings
: Average dollar amount expected by the owner if the dwelling were to be sold.

Renters
: Percentage of residents living in a dwelling not occupied by the owner.

Population aged less than 15 years
: Percentage of residents less than 15 years of age.

Population aged 65 years and over
: Percentage of residents aged 65 years and over.

Population living alone
: Percentage of residents living alone.

Lone-parent families
: Percentage of residents living in a lone-parent family.

Movers (1 year)
: Percentage of residents aged 1 year and over who were living at a different address one year earlier.

Stayers (5 years)
: Percentage of residents aged 5 years and over who were living at the same address five years earlier.

Automobile to work
: Percentage of residents who worked the year preceding the Census, who indicated having a fixed workplace and who used a car as driver as a principal means of transportation to travel between home and place of work.

No high school diploma
: Percentage of residents aged 20 years and over without a high school diploma.

University degree
: Percentage of residents aged 20 years and over with a university degree.

Average years of schooling
: Sum of the years of schooling at the elementary, high school, university and college levels (average for residents aged 15 years and over).

Unemployment rate
: Percentage of residents unemployed expressed as a percentage of the labour force.

Average employment income
: Average income from wages and salaries of residents aged 15 years and over with an income and working full-time.

Median employment income
: Median income from wages and salaries of residents aged 15 years and over with an income and working full-time. It corresponds to the 50th percentile which divides in two halves the number of considered cases.

Government transfers
: Percentage of total income composed of government transfers (benefits from Employment Insurance; benefits from Canada or Quebec Pension Plan; Canada Child Tax benefits; benefits from Social Assistance; etc.).

Low-income
: Percentage of residents who are part of an economic family spending 20% more than average on food, shelter and clothing.

Aboriginal peoples
: Percentage of residents who reported identifying with one Aboriginal group.

Recent immigrants
: Percentage of residents who immigrated to Canada from 1991 to 2001.

Visible minority
: Percentage of non-Aboriginal residents belonging to visible minorities.

Construction, manufacturing, transportation and warehousing
: Number of workers from sectors 23, 31-33 and 48-49 of the North American Industry Classification System (NAICS) who works in the spatial unit.

Wholesale trade
: Number of workers from sector 41 of the (NAICS) who works in the spatial unit.

Retail trade
: Number of workers from sector 44-45 of the (NAICS) who works in the spatial unit.

Other services
: Number of workers from sectors 51, 52, 53, 54, 55, 56, 71, 72 and 81 of the (NAICS) who works in the spatial unit.

Health care, social assistance and educational services
: Number of workers from sectors 61 and 62 of the (NAICS) who works in the spatial unit.

Public administration
: Number of workers from sector 91 of the (NAICS) who works in the spatial unit.

Density of workers in retail trade
: Density, in km², of workers from sector 44-45 of the (NAICS) who works in the spatial unit.

Density of workers in accommodation and food services
: Density, in km², of workers from sector 72 of the (NAICS) who works in the spatial unit.

Geocoding

Geocoding is the process of matching a particular address with a geographic location on the earth's surface. In this report, the address corresponds to the location of an incident that was reported to the police, after aggregation to the block-face level—that is, to one side of a city block between two consecutive intersections. This is done by matching records in two databases, one containing a list of addresses, the other containing information about the street network and the address range within a given block. The geocoding tool will match the address with its unique position in the street network. As the street network is geo-referenced (located in geographic space with reference to a co-ordinate system), it is possible to generate longitude and latitude values—or X and Y values—for each criminal incident. Where the incident location does not correspond to an address, geocoding is performed by creating a point on, say, an intersection of two streets or the middle of a public park. X and Y values in the criminal incident database provide the spatial component that allows points to be mapped, relative to the street or neighbourhood in which they occurred.

In 2001, the UCR2 Survey did not lend itself to collecting information on the geographic location of criminal incidents. For the purposes of this report, the Saskatoon police service sent to the CCJS the addresses of the incidents selected, reported and entered in the UCR2 database in 2001. This information was resolved by the CCJS into a set of geographical co-ordinates (X and Y) for each address. These co-ordinates were rolled up to the mid-point of a block-face in the case of specific addresses, and to intersection points in the case of streets and parks.

Saskatoon Police Service provided 23,711 selected incidents for 2001. The geocoding was successful for 92.5% of them. The low percentage of incidents that failed geocoding did not create a bias in offence trends. Incidents that failed geocoding contained information that was too vague, such as a bus number or a street without a civic number. In fact, geocoded offences and offences prior to geocoding both account for the same proportion of overall crime.

Mapping techniques

Kernel analysis is a method for making sense of a spatial distribution of crime data. This method makes it possible to examine criminal incident point data across neighbourhood boundaries and to identify areas where these incidents are concentrated. The goal of kernel analysis is to estimate how the density of events varies across a study area based on a point pattern. Kernel estimation was originally developed to estimate probability density from a sample of observations (Bailey and Gatrell 1995). In its application to spatial data, kernel analysis produces a smooth map of density values, where the density of each place corresponds to the concentration of points in a given area.

In kernel estimation, a fine grid is overlaid on the study area. Distances are measured from the centre of a grid cell to each observation that falls within a predefined region of influence known as a bandwidth. Each observation contributes to the density value of that grid cell based on its distance from the centre of the cell. Nearby observations are given more weight in the density calculation than those farther away. In this study, the grid cell size is 50 square metres and the research radius used is 500 metres.

The product of the kernel estimation method is a simple dot matrix (raster image) displaying contours of varying density. Contour loops define the boundaries of hotspot areas. Hotspots may be irregular in shape, and they are not limited by neighbourhood or other boundaries. This method of analysis was applied using the Spatial Analyst software of the Environmental Systems Research Institute.

Spatial units

Ecological studies such as those conducted in crime-mapping projects require a sufficiently large number of geographic units or neighbourhoods for the modelling of data to be effective and reliable. In previous studies, the geographic units used were locally-determined natural neighbourhoods (Winnipeg and Regina studies), census tracts (Montréal, Edmonton and Halifax) or dissemination areas (Thunder Bay).

The dissemination areas (DAs) of the 2001 Census were retained for the multivariate analyses in Section 3. It is the smallest standardized spatial unit to which data are disseminated.

DAs are small areas consisting of one or more blocks, with boundaries delimited by intersecting streets generally enclosing 400 to 700 residents. DAs must meet various delineation criteria designed to maximize their usefulness, including the following: DA boundaries respect the boundaries of census sub-divisions and census tracts (CT); DA boundaries follow roads as well as railways, water features and power transmission lines, where these features form part of the boundaries of census sub-divisions or CTs.

Only 328 of the 335 Saskatoon DAs are included in the analyses because average dwelling value were not available for the remaining seven, and that compromised the calculation of the factor scores. These seven DAs are scattered over the City of Saskatoon territory (Map 1). A total of 438 incidents were reported in these DAs (2% of all geocoded incidents). They have a collective crime rate of

63 incidents for 1,000 resident and workers, which is lower than Saskatoon's average of 72.

The official neighbourhoods of the City of Saskatoon were recreated by aggregation of census blocks. In a few exceptional locations, the neighbourhood boundaries as defined by the block-level aggregation do not exactly correspond to the official boundaries. These spatial units were used to develop the neighbourhood portraits discussed in Section 2.

Multivariate analysis

Ordinary least squares (OLS) regression is used to examine the distribution of violent and property crime rates as a function of the set of explanatory factors. The use of this method requires a continuous or quantitative outcome variable that has a normal distribution. As a number of variables studied here do not have normal distributions, it was necessary to submit the crime variables to normalizing transformations. The transformation needed was informed by the results of a Kolmogorov-Smirnov normality test. Variables have been normalized following this classification:

No transformation: Population aged less than 15 years; Median employment income; Density of workers in retail trade; Density of workers in accommodation and food services, Stayers (5 years); Rooms per dwellings;

Natural logarithm: Government transfers; Population living alone;

Square root: Dwellings built before 1961; Dwellings built after 1990; Dwellings needing major repairs; Average value of dwellings; Population aged 65 years and over; Member of a visible minority; Lone-parent family; Unemployment rate; Low-income; Renters, Recent immigrants; Movers (1 year); Aboriginal peoples; Violent crime rate; Property crime rate; Assault rate; Motor vehicle theft rate; Break and enter rate; Mischief rate; Shoplifting rate; Other theft rate.

The regressive models were developed using stepwise procedure. This method consists of a series of multiple regressions such that at each stage, the variable that accounts for the maximum remaining variance is added. At each stage, any superfluous variables are eliminated.

The standardized regression coefficients provide a means of assessing the relative importance of the different predictor variables in the multiple regression models. The coefficients indicate the expected change, in standard deviation units, of the dependent variable per one standard deviation unit increase in the independent variable, after controlling for the other variables. The maximum possible values are +1 and -1, with coefficient values closer to 0 indicating a weaker contribution to the explanation of the dependent variable.

Another aspect that must be taken into account in spatial analysis of data, such as crime data, is spatial autocorrelation (see "Spatial autocorrelation"). The presence of spatial autocorrelation is detected in the residuals of the OLS regression models for assault rate (Moran's I of 0.11; $p<0.01$), motor vehicle theft rate (Moran's I of 0.09; $p<0.01$), break and enter rate (Moran's I of 0.17; $p<0.01$), mischief rate (Moran's I of 0.07; $p<0.05$) and other theft rate (Moran's I of 0.09; $p<0.01$).

Spatial autocorrelation (by Krista Collins)

Data measured over a two-dimensional study area, such as the geocoding of criminal incidents, are often affected by the properties of the location in which they reside. If adjacent observations are affected by the same location properties, the observations will not be independent of one another. This lack of independence must be accounted for in the data analysis to produce accurate and unbiased results. This is accomplished through spatial modelling of data and is important for any dataset where there is a potential effect of location.

It is known that crime is not evenly distributed across cities and that it is concentrated in particular areas known as hot-spots. This is an initial indication that there might be a location effect in crime data can be seen by examining a map of crime density in city neighbourhoods. There could be a positive effect where areas with high crime rates are surrounded by other areas with high crime rates and areas with low crime rates that are adjacent to other areas with low crime rates. A negative location effect results from areas of low crime being surrounded by areas with high crime and vice versa. Either scenario indicates some sort of spatial structure or spatial dependence in the data, signifying that the neighbourhoods have an influence on each other. If the spatial structure of the data is not explained by the variables in the regression model, then there will be spatial effects in the model error terms. This phenomenon, which is known as spatial autocorrelation, violates the assumptions made in a standard regression analysis. The location effects must instead be accounted for in the multivariate model, to ensure accurate estimation of the regression coefficients and their associated variances.

For the purpose of spatial modelling, a definition of what constitutes neighbouring locations needs to be specified. In this analysis, a contiguity structure that includes all common borders or vertices that touch between the boundaries of the regions (first order queen contiguity) is used to define regions as neighbours of each other. The neighbourhood structure defines which locations have a potential influence on each other, the neighbours, and rules out any potential influence of regions that are not considered to be neighbours. The neighbourhood structure is used to test for spatial autocorrelation and to specify the spatial component in the autoregressive spatial model.

The basic process of modelling spatial data is to first fit a standard least squares regression model to the data and then test the error terms for the presence of spatial autocorrelation. This is done by a statistical test called Moran's I, which tests whether the error terms are randomly distributed over the study area. The value of the Moran's I statistic ranges from 1 to -1. A value approaching 1 indicates the presence of positive spatial autocorrelation, where regions with large error terms are adjacent to other areas with large error terms. A negative value near -1 indicates the presence of negative spatial autocorrelation, where regions with large error terms are neighbouring regions with small error terms. A value near zero indicates the absence of spatial autocorrelation. The significance of Moran's I statistic is determined by a random permutation approach, where a significant result indicates that there is spatial autocorrelation in the model error terms.

When spatial autocorrelation is detected in the residuals from a standard least squares regression model, a spatial model must be fit to the data instead. The spatial model provides the same analysis of the neighbourhood characteristics as the least

squares model but adjusts for the spatial effects. This can be done in one of two ways: by adding an extra term to represent the effect of neighbouring locations or by modelling a spatial process in the error terms. In the former model, called the spatial lag model, a direct effect of the crime rate in neighbouring locations is assumed. In this case the average value from all neighbouring locations, termed the spatial lag, is added to the regression model to represent the direct effect of the neighbouring regions. The other model, termed the spatial error model, assumes the relationship between crime rates in adjacent neighbourhoods is the result of the same relationship of the explanatory variables in the adjacent neighbourhoods. Thus the spatial autocorrelation, detected in the standard regression model, is the result of spatially autocorrelated variables not present in the model. To determine the appropriate type of spatial model to use for any given dataset, the data are empirically tested to determine the structure of the spatial dependency.

The results from a spatial regression analysis are essentially the same as other multivariate regression analyses. The regression coefficients represent the change in the crime rate for a unit change in the variable, when all other variables are held constant. Since the variables representing the neighbourhood characteristics are standardised, the size of their regression coefficients denote their relative contribution to the prediction of crime. The spatial lag and spatial error regression coefficients, however, cannot be explained in the same way. The spatial lag coefficient in part represents the effect of neighbouring locations but also accounts for some of the measurement error in using administrative units to define the neighbourhoods. Thus there is no direct interpretation of the spatial lag coefficient. Similarly, the spatial error coefficient represents a nuisance parameter in the model and has no direct interpretation. Rather, the spatial term is only retained in the model to make the other results accurate.

The overall fit of the spatial models is assessed by the squared correlation between the observed crime rate in each neighbourhood and the values predicted using the spatial model. This squared correlation is equivalent to the coefficient of determination (R^2), commonly used in standard regression models, where it represents the proportion of the variation explained by the regression model. However, in the presence of spatial autocorrelation the squared correlation between the observed and fitted values does not have the same interpretation. Rather, it represents the relative fit of the model. A value of 1 would represent a perfect fit of the model and values near zero indicate a poor predictive power of the model.

To ensure the spatial autocorrelation has been adequately accounted for in the model, the residuals from the spatial model are tested for the presence of spatial autocorrelation. This is done using Lagrange Multiplier tests, which test for the presence of spatial error dependence in the spatial lag model and for a missing spatial lag variable in the spatial error model. If the statistical test is not significant, it indicates the spatial dependence in the data has been accounted for in the model. In this study, the estimates of spatial autocorrelation and the autoregressive spatial models were computed using a custom-made SAS program.

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Endnotes

1. At the time this paper was prepared, some of the data from the 2006 Census had not been released. Since the analyses compare crime data to census data, the data relates to 2001.
2. According to the most recent census, this growth continued until 2006.
3. Statistics Canada's estimates of population are extracted from administrative files and derived from other Statistics Canada surveys and/or other sources. They are provided quarterly.
4. Specific incidents have been excluded from the analysis, mainly because their spatial location is not significant (for more detailed information, see Data sources in the Methodology section). Overall, 5,349 incidents were excluded from the analysis. They composed 18% of all incidents reported by the Saskatoon Police Service in 2001.
5. Approximately 7.5% of the incidents selected had to be excluded from the analyses because their location could not be accurately determined (e.g. a bus number or a street without any street number).
6. For each type of crime, all incidents with at least one crime of this type were included.
7. In this study, "central business district" refers to a specific neighbourhood defined by the City of Saskatoon and "downtown area" refers more broadly to the area in and around that neighbourhood.
8. It should be noted that in many of these studies, the statistical association between crime rates and residential mobility or aging dwellings did not prove to be significant after accounting for all neighbourhood variables at the same time in multivariate analyses. These results suggest that the relationship between police-reported crime rates and both residential mobility and aging dwellings could be mediated by the socio-economic context of the neighbourhood.

Appendix A

Table A.1

Count of police-reported crime incidents and population at risk in neighbourhoods of Saskatoon, 2001

Neighbourhoods	Selected incidents	Population at risk	Rate (per 1,000 residents and workers)	Total violent incidents[1]	Total property incidents[1]	Total other incidents[1,2]
	number	number	rate	number	number	number
City of Saskatoon	21,933	303,195	72	3,681	17,327	925
Confederation Suburban Centre	836	2,780	302	130	662	21
Riversdale	1,050	3,605	290	276	676	73
Pleasant Hill	1,904	6,805	280	562	1,189	121
Westmount	580	2,800	205	100	439	25
Mount Royal	882	5,050	175	188	643	29
West Industrial	102	620	162	12	79	8
Caswell Hill	832	5,480	151	155	618	27
King George	281	2,095	134	44	209	19
Meadowgreen	530	4,185	127	130	360	20
Mayfair	391	3,375	116	58	316	8
Massey Place	385	3,485	110	88	281	10
Greystone Heights	377	3,455	109	42	318	5
Central Industrial	258	2,425	105	39	190	17
Confederation Park	687	6,640	103	111	444	105
Central Business District	1,695	17,095	99	293	1,227	106
Kelsey-Woodlawn	454	4,700	96	74	336	21
University of Saskatchewan Lands - South Management Area	64	675	95	9	50	4
Hudson Bay Park	225	2,445	92	34	178	9
College Park	622	7,140	87	77	508	19
Sutherland Industrial	202	2,460	82	28	159	9
Holiday Park	102	1,280	80	22	70	5
Westview	332	4,120	80	58	261	8
Nutana	638	8,100	79	79	518	19
Grosvernor Park	193	2,440	79	15	165	5
Fairhaven	419	5,570	75	85	308	10
Airport	354	5,195	68	40	292	13
Haultain	226	3,395	66	28	189	4
Richmond Heights	76	1,195	64	4	68	2
Varsity View	321	5,060	63	25	274	11
Exhibition	211	3,335	63	33	159	14
City Park	543	8,750	62	80	438	10
Nutana Suburban Centre	263	4,250	62	35	214	4
Sutherland	287	4,960	58	41	231	6
Dundonald	329	5,715	58	55	260	4
North Park	114	1,975	58	16	93	2
Marquis Industrial	70	1,240	56	38	22	9
Pacific Heights	245	4,470	55	40	191	7
Buena Vista	288	5,315	54	42	229	10
Brevoort Park	260	4,830	54	24	224	8
Lawson Heights Suburban Centre	143	2,680	53	11	124	1
University of Saskatchewan Lands - North Management Area	23	420	53	5	17	0
Adelaine - Churchill	163	3,275	50	15	135	2
River Heights	279	5,725	49	20	242	8
Holliston	217	4,460	48	28	172	12
Parkridge	241	5,185	47	39	188	5
Montgomery Place	156	3,350	46	26	119	6
Eastview	180	3,925	46	19	151	7
Queen Elizabeth	134	2,935	46	15	113	5
Avalon	157	3,605	43	22	128	5
Lawson Heights	209	5,140	41	22	173	8
Forest Grove	249	6,155	40	30	207	5
College Park East	189	5,015	38	18	160	5
Agriplace	43	1,210	36	4	32	1

See note(s) at the end of the table.

Table A.1

Count of police-reported crime incidents and population at risk in neighbourhoods of Saskatoon, 2001 (continued)

Neighbourhoods	Selected incidents	Population at risk	Rate (per 1,000 residents and workers)	Total violent incidents[1]	Total property incidents[1]	Total other incidents[1,2]
	number	number	rate	number	number	number
Silverwood Heights	352	12,130	29	47	298	7
Lakeview	231	8,335	28	27	192	8
Erindale	136	5,055	27	22	111	3
Wildwood	245	9,305	26	26	211	5
North Industrial	202	7,720	26	7	183	5
Nutana Park	104	4,110	25	5	93	3
Hudson Bay Industrial	119	4,770	25	6	110	2
Silverspring	92	3,905	24	20	65	2
Lakeridge	95	4,550	21	6	87	1
C.N. Industrial	33	1,675	20	1	28	2
South West Industrial	56	3,140	18	12	36	3
Briarwood	32	1,815	18	2	29	1
U of S Management Area	194	11,765	16	10	175	4
Arbor Creek	22	1,845	12	4	17	1
Stonebridge	4	350	11	0	4	0
University Heights Suburban Centre	5	615	8	2	2	1

0 true zero or a value rounded to zero

1. Includes most serious violation in each incident only.
2. Includes prostitution, offensive weapons, gaming and betting and other *Criminal Code* offences.

Sources: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, geocoded database 2001, and Census 2001.

Table A.2

Count of police-reported crime incidents for selected property offences in neighbourhoods of Saskatoon, 2001

Neighbourhoods	Arson[1]	Break and enter[1]	Mischief[1]	Motor vehicle theft[1]	Shop-lifting[1]	Other theft[1,2]
	number	number	number	number	number	number
City of Saskatoon	176	3,898	3,967	1,205	1,217	6,028
Confederation Suburban Centre	1	58	69	65	271	207
Riversdale	9	211	180	61	15	182
Pleasant Hill	27	376	336	105	21	322
Westmount	3	127	95	47	19	172
Mount Royal	8	194	111	72	80	180
West Industrial	2	28	12	5	0	31
Caswell Hill	4	216	140	72	1	177
King George	3	86	41	28	0	55
Meadowgreen	9	123	95	48	0	99
Mayfair	0	86	68	25	39	102
Massey Place	10	83	64	37	4	93
Greystone Heights	2	50	55	9	91	114
Central Industrial	5	26	47	7	3	106
Confederation Park	7	105	119	33	14	141
Central Business District	6	123	189	56	202	512
Kelsey-Woodlawn	4	81	52	30	9	151
University of Saskatchewan Lands - South Management Area	0	5	17	2	0	28
Hudson Bay Park	0	53	39	8	20	65
College Park	1	65	97	18	117	195
Sutherland Industrial	1	39	31	11	9	62
Holiday Park	0	22	13	7	0	28

See note(s) at the end of the table.

Table A.2

Count of police-reported crime incidents for selected property offences in neighbourhoods of Saskatoon, 2001 (continued)

Neighbourhoods	Arson[1]	Break and enter[1]	Mischief[1]	Motor vehicle theft[1]	Shop-lifting[1]	Other theft[1,2]
	number	number	number	number	number	number
Westview	2	65	57	29	4	101
Nutana	4	134	119	27	30	213
Grosvernor Park	0	24	19	8	17	67
Fairhaven	2	86	88	38	4	102
Airport	4	73	69	19	8	122
Haultain	3	45	62	6	4	64
Richmond Heights	0	23	14	6	0	27
Varsity View	3	62	61	8	5	125
Exhibition	4	42	36	17	1	59
City Park	1	103	63	34	8	217
Nutana Suburban Centre	0	28	40	10	50	92
Sutherland	3	53	72	11	0	99
Dundonald	3	58	91	22	5	80
North Park	2	31	19	9	1	32
Marquis Industrial	4	7	3	2	0	6
Pacific Heights	2	41	76	16	0	54
Buena Vista	0	69	48	13	38	58
Brevoort Park	4	49	53	16	0	81
Lawson Heights Suburban Centre	0	3	8	3	72	40
University of Saskatchewan Lands - North Management Area	2	6	4	3	0	4
Adelaine - Churchill	4	33	42	4	0	59
River Heights	1	49	81	8	10	97
Holliston	1	46	43	6	1	75
Parkridge	2	48	80	12	0	54
Montgomery Place	1	37	42	5	0	39
Eastview	1	24	85	8	0	32
Queen Elizabeth	2	29	27	4	2	44
Avalon	2	41	38	6	2	37
Lawson Heights	0	30	53	8	2	77
Forest Grove	0	33	69	7	2	106
College Park East	3	26	46	6	4	80
Agriplace	0	7	6	6	2	10
Silverwood Heights	4	62	95	12	4	112
Lakeview	1	39	61	9	4	67
Erindale	0	13	57	6	1	27
Wildwood	5	33	67	9	0	91
North Industrial	1	45	33	14	11	65
Nutana Park	1	23	23	7	0	36
Hudson Bay Industrial	0	31	16	7	7	42
Silverspring	0	10	22	5	0	32
Lakeridge	0	22	42	1	0	25
C.N. Industrial	0	8	8	2	3	9
South West Industrial	1	11	7	7	0	17
Briarwood	0	3	14	0	0	10
U of S Management Area	1	31	30	2	0	109
Arbor Creek	0	3	5	0	0	8
Stonebridge	0	0	1	1	0	2
University Heights Suburban Centre	0	0	2	0	0	1

0 true zero or a value rounded to zero

1. Includes all recorded violations in each incident.
2. Excludes incidents of motor vehicle theft and shoplifting.

Source: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, geocoded database 2001.

Table A.3

Count of police-reported crime incidents for selected offences in neighbourhoods of Saskatoon, 2001

Neighbourhoods	Homicide[1,2]	All sexual offences[1,3]	Assault[1]	Robbery[1]	Prostitution[1]	Drug incidents[1]
	number	number	number	number	number	number
City of Saskatoon	5	189	2,331	476	44	445
Confederation Suburban Centre	0	1	75	27	0	11
Riversdale	0	13	184	41	17	21
Pleasant Hill	0	31	397	74	11	37
Westmount	0	5	67	17	1	10
Mount Royal	1	7	108	40	0	15
West Industrial	0	0	5	6	2	2
Caswell Hill	1	6	113	25	1	6
King George	0	0	28	6	4	3
Meadowgreen	1	11	95	17	0	9
Mayfair	0	1	41	9	0	1
Massey Place	0	7	59	9	1	4
Greystone Heights	0	0	29	3	0	2
Central Industrial	0	5	28	3	0	6
Confederation Park	0	6	64	22	0	92
Central Business District	0	7	163	54	1	43
Kelsey-Woodlawn	0	1	54	10	0	12
University of Saskatchewan Lands - South Management Area	0	3	4	0	0	2
Hudson Bay Park	0	0	23	0	0	0
College Park	0	2	42	10	0	10
Sutherland Industrial	0	0	20	2	0	3
Holiday Park	0	2	12	3	1	3
Westview	0	4	38	6	0	5
Nutana	0	2	45	16	0	13
Grosvenor Park	0	0	8	3	0	3
Fairhaven	0	7	48	6	0	6
Airport	0	5	29	2	0	9
Haultain	0	2	16	2	0	3
Richmond Heights	0	0	3	0	0	1
Varsity View	0	3	16	1	0	5
Exhibition	0	2	21	2	0	6
City Park	0	7	39	7	0	3
Nutana Suburban Centre	0	0	20	4	0	3
Sutherland	0	1	27	2	0	3
Dundonald	0	3	33	3	0	1
North Park	0	1	7	1	0	1
Marquis Industrial	2	1	27	0	0	9
Pacific Heights	0	1	26	3	0	1
Buena Vista	0	2	26	4	0	5
Brevoort Park	0	2	15	3	0	4
Lawson Heights Suburban Centre	0	0	6	4	0	0
University of Saskatchewan Lands - North Management Area	0	0	2	0	0	0
Adelaine - Churchill	0	1	12	0	0	0
River Heights	0	0	12	1	0	8
Holliston	0	2	19	4	0	7
Parkridge	0	5	26	3	0	4
Montgomery Place	0	2	17	1	1	1
Eastview	0	2	15	0	0	6
Queen Elizabeth	0	2	8	1	0	4
Avalon	0	1	14	5	0	3
Lawson Heights	0	3	16	2	2	4
Forest Grove	0	5	16	2	2	4
College Park East	0	1	10	1	0	2

See note(s) at the end of the table.

Table A.3

Count of police-reported crime incidents for selected offences in neighbourhoods of Saskatoon, 2001 (continued)

Neighbourhoods	Homicide[1,2]	All sexual offences[1,3]	Assault[1]	Robbery[1]	Prostitution[1]	Drug incidents[1]
	number	number	number	number	number	number
Agriplace	0	0	3	0	0	0
Silverwood Heights	0	3	21	2	0	5
Lakeview	0	2	12	3	0	4
Erindale	0	3	11	0	0	2
Wildwood	0	3	15	0	0	3
North Industrial	0	0	4	1	0	2
Nutana Park	0	0	4	0	0	1
Hudson Bay Industrial	0	0	3	0	0	1
Silverspring	0	1	12	0	0	1
Lakeridge	0	0	2	0	0	1
C.N. Industrial	0	0	0	0	0	2
South West Industrial	0	0	9	0	0	3
Briarwood	0	0	0	0	0	1
U of S Management Area	0	2	7	0	0	3
Arbor Creek	0	0	0	2	0	0
Stonebridge	0	0	0	0	0	0
University Heights Suburban Centre	0	0	0	1	0	0

0 true zero or a value rounded to zero
1. Includes all recorded violations in each incident.
2. Includes attempted murder and conspire to commit murder.
3. Includes sexual assault (levels 1 to 3) and other sexual violations.

Source: Statistics Canada, Canadian Centre for Justice Statistics, Incident-based Uniform Crime Reporting Survey, geocoded database 2001.

Table A.4

Population at risk and age structure in neighbourhoods of Saskatoon, 2001

Neighbourhoods	Residents	Workers	Population at risk	Population aged 15 and under	Population aged 65 and over
	number	number	number	percentage	percentage
City of Saskatoon	193,660	109,535	303,195	20	12
Confederation Suburban Centre	560	2,220	2,780	37	14
Riversdale	2,250	1,355	3,605	28	11
Pleasant Hill	4,415	2,390	6,805	27	9
Westmount	2,290	510	2,800	22	9
Mount Royal	4,115	935	5,050	15	22
West Industrial	25	595	620	26	11
Caswell Hill	3,510	1,970	5,480	20	8
King George	1,790	305	2,095	22	10
Meadowgreen	3,855	330	4,185	25	9
Mayfair	2,540	835	3,375	19	11
Massey Place	3,285	200	3,485	25	7
Greystone Heights	2,335	1,120	3,455	20	16
Central Industrial	135	2,290	2,425	0	0
Confederation Park	6,295	345	6,640	29	4
Central Business District	2,475	14,620	17,095	1	54
Kelsey-Woodlawn	865	3,835	4,700	18	16
University of Saskatchewan Lands - South Management Area	595	80	675	16	1
Hudson Bay Park	1,775	670	2,445	15	30
College Park	5,065	2,075	7,140	19	9
Sutherland Industrial	380	2,080	2,460	18	2
Holiday Park	1,140	140	1,280	16	15

See note(s) at the end of the table.

Table A.4

Population at risk and age structure in neighbourhoods of Saskatoon, 2001 (continued)

Neighbourhoods	Residents	Workers	Population at risk	Population aged 15 and under	Population aged 65 and over
	number	number	number	percentage	percentage
Westview	3,415	705	4,120	25	6
Nutana	6,150	1,950	8,100	13	14
Grosvernor Park	1,365	1,075	2,440	10	14
Fairhaven	5,225	345	5,570	23	8
Airport	530	4,665	5,195	30	2
Haultain	2,800	595	3,395	17	12
Richmond Heights	1,070	125	1,195	17	28
Varsity View	3,485	1,575	5,060	8	16
Exhibition	2,485	850	3,335	15	12
City Park	4,305	4,445	8,750	8	19
Nutana Suburban Centre	2,145	2,105	4,250	6	75
Sutherland	4,220	740	4,960	17	12
Dundonald	5,280	435	5,715	29	4
North Park	1,790	185	1,975	18	12
Marquis Industrial	0	1,240	1,240	x	x
Pacific Heights	4,265	205	4,470	26	3
Buena Vista	2,845	2,470	5,315	13	14
Brevoort Park	3,315	1,515	4,830	18	13
Lawson Heights Suburban Centre	1,230	1,450	2,680	3	61
University of Saskatchewan Lands - North Management Area	0	420	420	x	x
Adelaine - Churchill	3,000	275	3,275	22	17
River Heights	4,855	870	5,725	18	9
Holliston	3,355	1,105	4,460	19	15
Parkridge	4,500	685	5,185	29	4
Montgomery Place	2,735	615	3,350	21	11
Eastview	3,460	465	3,925	19	14
Queen Elizabeth	2,550	385	2,935	21	14
Avalon	3,160	445	3,605	21	17
Lawson Heights	4,650	490	5,140	19	4
Forest Grove	5,655	500	6,155	24	4
College Park East	4,630	385	5,015	21	5
Agriplace	0	1,210	1,210	x	x
Silverwood Heights	11,090	1,040	12,130	22	4
Lakeview	7,520	815	8,335	21	7
Erindale	4,465	590	5,055	29	3
Wildwood	6,795	2,510	9,305	13	18
North Industrial	0	7,720	7,720	x	x
Nutana Park	3,345	765	4,110	21	15
Hudson Bay Industrial	0	4,770	4,770	x	x
Silverspring	3,520	385	3,905	29	3
Lakeridge	4,175	375	4,550	29	4
C.N. Industrial	0	1,675	1,675	x	x
South West Industrial	325	2,815	3,140	19	6
Briarwood	1,690	125	1,815	18	9
U of S Management Area	50	11,715	11,765	0	0
Arbor Creek	1,760	85	1,845	31	3
Stonebridge	160	190	350	0	91
University Heights Suburban Centre	550	65	615	4	39

0 true zero or a value rounded to zero

x suppressed to meet the confidentiality requirements of the *Statistics Act*

Source: Statistics Canada, Census 2001.

Table A.5

Dwellings characteristics in neighbourhoods of Saskatoon, 2001

Neighbourhoods	Rooms per dwelling	Dwellings built before 1961	Dwellings built after 1990	Dwellings needing major repairs	Average value of dwellings
	number	percentage	percentage	percentage	dollars
City of Saskatoon	6.5	25	5	8	120,124
Confederation Suburban Centre	5.4	3	3	8	84,601
Riversdale	5.6	79	1	18	82,742
Pleasant Hill	4.8	39	4	14	69,065
Westmount	5.2	75	3	20	74,800
Mount Royal	6.0	53	0	8	101,646
West Industrial	7.1	100	0	23	x
Caswell Hill	6.0	82	3	14	85,541
King George	6.2	76	0	12	71,699
Meadowgreen	5.9	16	1	6	98,441
Mayfair	6.1	66	3	13	82,887
Massey Place	6.8	5	0	8	103,898
Greystone Heights	6.7	23	1	3	138,475
Central Industrial	4.7	57	10	22	x
Confederation Park	6.8	2	5	7	102,471
Central Business District	3.7	19	10	4	145,983
Kelsey-Woodlawn	5.7	82	0	12	72,816
University of Saskatchewan Lands - South Management Area	3.9	2	4	4	x
Hudson Bay Park	6.0	37	5	4	96,299
College Park	6.8	5	0	7	128,650
Sutherland Industrial	4.4	9	0	6	x
Holiday Park	6.2	75	1	13	76,420
Westview	7.3	6	13	6	108,034
Nutana	5.8	53	7	9	169,663
Grosvernor Park	6.1	54	9	7	168,771
Fairhaven	6.0	2	5	4	98,414
Airport	5.3	91	0	32	x
Haultain	6.1	79	1	9	119,381
Richmond Heights	6.2	2	2	10	119,678
Varsity View	5.6	58	2	4	163,881
Exhibition	5.6	60	3	12	108,377
City Park	4.6	44	1	7	123,763
Nutana Suburban Centre	3.8	4	23	2	134,465
Sutherland	5.9	25	6	8	102,801
Dundonald	7.2	2	15	1	123,785
North Park	6.4	65	1	11	99,500
Marquis Industrial	x	x	x	x	x
Pacific Heights	7.7	2	0	4	96,531
Buena Vista	5.9	76	11	10	100,913
Brevoort Park	6.4	10	1	6	126,973
Lawson Heights Suburban Centre	4.6	0	47	1	110,478
University of Saskatchewan Lands - North Management Area	x	x	x	x	x
Adelaine - Churchill	7.9	70	0	2	128,035
River Heights	7.3	2	1	5	142,709
Holliston	6.7	53	0	8	125,536
Parkridge	7.5	0	7	2	125,186
Montgomery Place	8.2	29	2	6	144,911
Eastview	6.9	3	0	6	126,713
Queen Elizabeth	7.0	84	1	4	121,214
Avalon	6.9	66	9	1	129,939
Lawson Heights	7.1	1	1	4	150,231
Forest Grove	7.0	4	5	5	119,781
College Park East	7.1	1	2	4	118,883
Agriplace	x	x	x	x	x
Silverwood Heights	8.0	0	2	2	150,984
Lakeview	7.5	0	1	3	146,922

See note(s) at the end of the table.

Table A.5

Dwellings characteristics in neighbourhoods of Saskatoon, 2001 (continued)

Neighbourhoods	Rooms per dwelling	Dwellings built before 1961	Dwellings built after 1990	Dwellings needing major repairs	Average value of dwellings
	number	percentage	percentage	percentage	dollars
Erindale	8.3	0	47	1	173,499
Wildwood	6.2	1	15	3	125,121
North Industrial	x	x	x	x	x
Nutana Park	8.1	18	0	5	131,551
Hudson Bay Industrial	x	x	x	x	x
Silverspring	7.6	0	85	1	179,811
Lakeridge	8.9	0	28	0	174,093
C.N. Industrial	x	x	x	x	x
South West Industrial	5.5	11	0	2	x
Briarwood	9.0	0	88	0	246,786
U of S Management Area	6.3	9	0	0	x
Arbor Creek	8.1	0	99	0	221,530
Stonebridge	3.6	0	0	0	66,651
University Heights Suburban Centre	5.5	0	99	0	148,629

0 true zero or a value rounded to zero
x suppressed to meet the confidentiality requirements of the *Statistics Act*
Source: Statistics Canada, Census 2001.

Table A.6

Education, immigration, visible minority and Aboriginal peoples in neighbourhoods of Saskatoon, 2001

Neighbourhoods	Average years of schooling	Population without a high school diploma	Population with a university degree	Recent immigrants	Visible minority	Aboriginal peoples
	number	percentage	percentage	percentage	percentage	percentage
City of Saskatoon	13.2	20	31	3	7	10
Confederation Suburban Centre	11.7	6	46	0	10	37
Riversdale	11.7	8	60	4	22	43
Pleasant Hill	11.2	6	58	3	14	48
Westmount	11.8	7	43	0	2	22
Mount Royal	11.6	7	49	1	6	16
West Industrial	11.3	15	70	0	0	63
Caswell Hill	12.9	14	35	2	3	21
King George	11.7	5	47	1	2	18
Meadowgreen	11.6	6	52	6	10	28
Mayfair	12.3	11	42	3	4	20
Massey Place	12.0	6	39	3	5	20
Greystone Heights	14.6	37	20	6	15	7
Central Industrial	13.0	0	34	0	0	20
Confederation Park	12.1	7	41	2	13	17
Central Business District	12.7	21	43	2	4	7
Kelsey-Woodlawn	11.9	3	52	0	1	20
University of Saskatchewan Lands - South Management Area	16.9	48	6	63	82	2
Hudson Bay Park	11.8	8	44	1	3	10
College Park	13.9	27	25	6	13	8
Sutherland Industrial	13.8	16	27	0	4	19
Holiday Park	11.9	9	43	3	9	6
Westview	12.3	8	37	2	6	15
Nutana	14.9	39	17	4	5	6

See note(s) at the end of the table.

Table A.6

Education, immigration, visible minority and Aboriginal peoples in neighbourhoods of Saskatoon, 2001 (continued)

Neighbourhoods	Average years of schooling	Population without a high school diploma	Population with a university degree	Recent immigrants	Visible minority	Aboriginal peoples
	number	percentage	percentage	percentage	percentage	percentage
Grosvernor Park	15.5	45	17	7	13	4
Fairhaven	12.2	7	40	3	9	19
Airport	11.7	3	57	1	6	27
Haultain	14.2	31	22	1	4	6
Richmond Heights	12.9	20	32	3	3	5
Varsity View	15.1	40	16	3	11	4
Exhibition	12.8	12	35	1	4	11
City Park	13.9	29	25	5	7	8
Nutana Suburban Centre	10.6	9	65	5	4	1
Sutherland	13.2	18	28	1	3	8
Dundonald	12.7	9	33	2	8	8
North Park	13.0	15	35	2	3	5
Marquis Industrial	x	x	x	x	x	x
Pacific Heights	12.1	5	39	2	7	15
Buena Vista	13.7	22	23	3	5	7
Brevoort Park	13.6	24	26	2	6	7
Lawson Heights Suburban Centre	11.0	11	49	0	1	1
University of Saskatchewan Lands - North Management Area	x	x	x	x	x	x
Adelaine - Churchill	13.5	24	29	0	3	4
River Heights	14.0	27	22	2	4	3
Holliston	13.4	21	24	1	4	6
Parkridge	12.6	9	34	2	5	10
Montgomery Place	12.6	12	35	0	3	3
Eastview	13.0	17	33	5	8	7
Queen Elizabeth	13.7	24	25	1	5	6
Avalon	13.4	21	27	1	1	3
Lawson Heights	13.7	22	22	3	5	3
Forest Grove	13.5	20	23	3	5	6
College Park East	13.8	25	25	1	7	2
Agriplace	x	x	x	x	x	x
Silverwood Heights	13.5	20	25	1	5	4
Lakeview	14.0	28	21	4	12	4
Erindale	14.1	29	21	2	7	3
Wildwood	13.8	26	25	4	7	3
North Industrial	x	x	x	x	x	x
Nutana Park	13.6	26	25	2	3	9
Hudson Bay Industrial	x	x	x	x	x	x
Silverspring	14.1	29	20	2	5	3
Lakeridge	14.1	27	20	1	8	3
C.N. Industrial	x	x	x	x	x	x
South West Industrial	12.3	3	44	0	2	23
Briarwood	14.2	32	18	6	20	0
U of S Management Area	13.9	28	33	4	8	0
Arbor Creek	14.2	30	21	2	6	5
Stonebridge	10.7	5	56	0	0	0
University Heights Suburban Centre	13.2	23	26	5	8	5

0 true zero or a value rounded to zero

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Source: Statistics Canada, Census 2001.

Table A.7

Socio-economic characteristics in neighbourhoods of Saskatoon, 2001

Neighbourhoods	Average employment income	Government transfers	Low income	Unemployment rate	Lone-parent families
	dollars	percentage	percentage	percentage	percentage
City of Saskatoon	37,290	12	26	7	13
Confederation Suburban Centre	26,397	31	45	27	51
Riversdale	23,269	38	63	26	28
Pleasant Hill	20,635	38	63	26	29
Westmount	24,340	20	41	16	22
Mount Royal	29,411	24	23	12	17
West Industrial	x	x	x	x	0
Caswell Hill	27,419	18	32	9	22
King George	23,661	25	40	9	22
Meadowgreen	26,079	23	38	12	27
Mayfair	25,355	19	34	10	19
Massey Place	29,622	16	33	8	21
Greystone Heights	37,081	11	18	6	8
Central Industrial	x	x	x	x	0
Confederation Park	29,598	13	21	8	21
Central Business District	37,418	28	29	10	3
Kelsey-Woodlawn	24,170	23	38	3	20
University of Saskatchewan Lands - South Management Area	12,772	14	75	15	2
Hudson Bay Park	24,260	29	17	8	10
College Park	37,467	10	17	9	12
Sutherland Industrial	15,295	17	69	19	33
Holiday Park	30,451	20	24	10	16
Westview	31,958	12	15	5	17
Nutana	44,170	8	21	6	10
Grosvernor Park	57,274	8	29	7	12
Fairhaven	29,300	14	19	8	18
Airport	17,205	35	70	22	34
Haultain	33,660	13	23	8	11
Richmond Heights	33,005	20	14	3	5
Varsity View	33,233	11	31	8	5
Exhibition	28,033	16	23	4	15
City Park	33,065	16	31	9	8
Nutana Suburban Centre	30,012	49	37	11	9
Sutherland	28,845	14	29	8	12
Dundonald	32,856	9	15	5	13
North Park	34,039	12	15	6	9
Marquis Industrial	x	x	x	x	x
Pacific Heights	31,384	11	20	7	14
Buena Vista	32,519	13	14	3	13
Brevoort Park	33,849	12	21	9	12
Lawson Heights Suburban Centre	38,873	34	16	0	3
University of Saskatchewan Lands - North Management Area	x	x	x	x	x
Adelaine - Churchill	43,003	11	5	8	8
River Heights	48,884	6	7	5	10
Holliston	31,314	15	17	7	16
Parkridge	35,627	8	16	4	17
Montgomery Place	42,704	9	4	3	5
Eastview	37,881	13	19	5	12
Queen Elizabeth	31,648	13	15	6	16
Avalon	39,946	13	11	3	12
Lawson Heights	42,835	5	16	8	11
Forest Grove	35,338	8	17	7	14
College Park East	40,588	7	9	6	10
Agriplace	x	x	x	x	x
Silverwood Heights	44,358	6	5	5	10
Lakeview	49,065	6	13	5	9
Erindale	53,460	3	3	3	6

See note(s) at the end of the table.

Table A.7

Socio-economic characteristics in neighbourhoods of Saskatoon, 2001 (continued)

Neighbourhoods	Average employment income	Government transfers	Low income	Unemployment rate	Lone-parent families
	dollars	percentage	percentage	percentage	percentage
Wildwood	35,991	13	17	7	11
North Industrial	x	x	x	x	x
Nutana Park	43,912	11	10	6	10
Hudson Bay Industrial	x	x	x	x	x
Silverspring	45,506	4	4	4	3
Lakeridge	51,395	4	1	4	7
C.N. Industrial	x	x	x	x	x
South West Industrial	26,790	17	37	17	13
Briarwood	73,397	3	5	5	3
U of S Management Area	x	x	x	x	0
Arbor Creek	59,765	3	1	3	6
Stonebridge	x	x	x	x	0
University Heights Suburban Centre	34,817	19	8	4	10

0 true zero or a value rounded to zero
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Source: Statistics Canada, Census 2001.

Table A.8

Lifestyle variables in neighbourhoods of Saskatoon, 2001

Neighbourhoods	Population living alone	Renters	Automobile to work	Stayers (5 years)	Movers (1 year)
	percentage	percentage	percentage	percentage	percentage
City of Saskatoon	12	31	84	51	20
Confederation Suburban Centre	8	58	66	40	23
Riversdale	15	65	62	36	35
Pleasant Hill	17	74	66	26	44
Westmount	10	41	78	51	22
Mount Royal	17	35	81	58	20
West Industrial	22	78	x	11	11
Caswell Hill	17	37	77	40	21
King George	13	37	81	52	22
Meadowgreen	12	51	82	43	32
Mayfair	12	36	80	43	22
Massey Place	6	38	86	51	23
Greystone Heights	12	34	78	54	22
Central Industrial	17	100	64	0	75
Confederation Park	5	29	89	50	17
Central Business District	57	82	46	46	24
Kelsey-Woodlawn	14	48	74	44	28
University of Saskatchewan Lands - South Management Area	17	100	14	6	28
Hudson Bay Park	17	33	87	51	23
College Park	10	34	83	56	19
Sutherland Industrial	15	98	80	9	30
Holiday Park	12	33	82	49	26
Westview	4	20	94	54	15
Nutana	24	42	69	40	25
Grosvernor Park	21	39	71	44	24
Fairhaven	10	45	85	44	22
Airport	12	100	77	18	53
Haultain	18	36	81	46	23
Richmond Heights	20	29	74	67	15
Varsity View	25	53	65	38	31
Exhibition	20	40	81	47	23

See note(s) at the end of the table.

Table A.8

Lifestyle variables in neighbourhoods of Saskatoon, 2001 (continued)

Neighbourhoods	Population living alone	Renters	Automobile to work	Stayers (5 years)	Movers (1 year)
	percentage	percentage	percentage	percentage	percentage
City Park	38	61	62	37	27
Nutana Suburban Centre	51	73	72	49	17
Sutherland	13	46	82	43	26
Dundonald	3	20	92	49	14
North Park	18	27	82	66	15
Marquis Industrial	x	x	x	x	x
Pacific Heights	3	20	89	64	9
Buena Vista	20	28	83	49	24
Brevoort Park	13	38	82	58	18
Lawson Heights Suburban Centre	32	20	89	41	18
University of Saskatchewan Lands - North Management Area	x	x	x	x	x
Adelaine - Churchill	7	10	86	65	10
River Heights	9	17	89	59	15
Holliston	15	30	84	54	14
Parkridge	3	26	91	60	15
Montgomery Place	4	5	94	72	7
Eastview	10	38	83	58	20
Queen Elizabeth	9	33	80	55	16
Avalon	12	18	91	60	12
Lawson Heights	8	31	88	59	22
Forest Grove	6	31	91	49	23
College Park East	8	16	90	63	12
Agriplace	x	x	x	x	x
Silverwood Heights	4	17	92	61	12
Lakeview	7	21	91	52	19
Erindale	3	2	93	60	8
Wildwood	15	32	87	50	20
North Industrial	x	x	x	x	x
Nutana Park	6	13	90	60	15
Hudson Bay Industrial	x	x	x	x	x
Silverspring	3	2	92	22	22
Lakeridge	1	2	93	66	12
C.N. Industrial	x	x	x	x	x
South West Industrial	17	91	83	32	39
Briarwood	1	0	98	39	23
U of S Management Area	0	100	45	65	25
Arbor Creek	2	0	94	15	22
Stonebridge	51	30	38	55	15
University Heights Suburban Centre	19	12	88	4	30

0 true zero or a value rounded to zero

x suppressed to meet the confidentiality requirements of the *Statistics Act*

Source: Statistics Canada, Census 2001.

Table A.9

Workers industrial sectors in neighbourhoods of Saskatoon, 2001

Neighbourhoods	Construction, manufacturing, transportation and warehousing	Wholesale trade	Retail trade	Other services	Health care, social assistance and educational services	Public administration
	number	number	number	number	number	number
City of Saskatoon	18,020	5,585	14,050	27,290	25,805	6,250
Confederation Suburban Centre	20	0	1,085	450	195	25
Riversdale	130	25	230	430	260	115
Pleasant Hill	120	10	105	340	1,365	25
Westmount	10	0	45	145	195	0
Mount Royal	50	10	170	215	365	0
West Industrial	315	70	85	90	0	0
Caswell Hill	380	85	185	580	320	95
King George	0	10	45	65	55	35
Meadowgreen	35	10	55	55	100	0
Mayfair	25	0	255	130	110	0
Massey Place	30	10	15	20	115	0
Greystone Heights	20	0	640	205	65	20
Central Industrial	510	105	115	255	810	215
Confederation Park	20	25	20	90	175	0
Central Business District	575	315	1,690	6,230	1,800	2,275
Kelsey-Woodlawn	685	520	950	740	320	20
University of Saskatchewan Lands - South Management Area	0	0	0	10	60	10
Hudson Bay Park	35	0	120	125	260	85
College Park	35	55	420	455	820	0
Sutherland Industrial	780	70	140	655	85	160
Holiday Park	25	0	0	40	30	15
Westview	335	15	25	215	55	10
Nutana	140	35	375	755	385	10
Grosvernor Park	35	10	250	225	115	150
Fairhaven	20	15	40	75	170	10
Airport	1,355	505	260	1,410	155	325
Haultain	55	10	70	325	135	0
Richmond Heights	15	0	0	30	45	0
Varsity View	95	10	140	470	390	10
Exhibition	125	30	35	460	140	0
City Park	320	95	225	1,420	2,140	60
Nutana Suburban Centre	0	0	435	555	890	15
Sutherland	25	0	75	130	155	10
Dundonald	30	10	50	125	185	25
North Park	20	0	20	40	85	10
Marquis Industrial	895	85	10	35	0	215
Pacific Heights	20	0	0	65	95	25
Buena Vista	225	80	160	695	505	555
Brevoort Park	40	40	215	445	205	0
Lawson Heights Suburban Centre	60	0	635	270	90	0
University of Saskatchewan Lands - North Management Area	0	0	0	15	55	335
Adelaine - Churchill	0	0	35	105	115	10
River Heights	70	15	125	280	230	60
Holliston	15	10	195	450	145	0
Parkridge	30	0	10	60	585	0
Montgomery Place	315	90	10	70	110	10
Eastview	20	10	50	140	190	10
Queen Elizabeth	10	10	45	130	140	20
Avalon	15	35	55	130	130	0

See note(s) at the end of the table.

Table A.9
Workers industrial sectors in neighbourhoods of Saskatoon, 2001 (continued)

Neighbourhoods	Construction, manufacturing, transportation and warehousing	Wholesale trade	Retail trade	Other services	Health care, social assistance and educational services	Public administration
	number	number	number	number	number	number
Lawson Heights	35	0	30	195	190	10
Forest Grove	35	15	45	140	215	10
College Park East	40	0	55	110	180	0
Agriplace	360	140	325	195	10	75
Silverwood Heights	105	20	105	295	390	35
Lakeview	50	45	85	320	225	10
Erindale	20	25	55	75	245	10
Wildwood	50	65	1,070	465	305	60
North Industrial	3,295	1,340	1,340	1,165	45	10
Nutana Park	20	10	350	150	180	10
Hudson Bay Industrial	2,255	840	405	975	20	10
Silverspring	55	0	0	145	150	25
Lakeridge	55	10	20	115	125	0
C.N. Industrial	985	390	60	115	20	45
South West Industrial	2,030	105	40	330	20	10
Briarwood	30	20	10	25	10	10
U of S Management Area	420	95	115	1,735	8,250	885
Arbor Creek	0	15	0	50	20	0
Stonebridge	0	0	0	10	100	10
University Heights Suburban Centre	0	10	0	25	0	20

0 true zero or a value rounded to zero
Source: Statistics Canada, Census 2001.

Canadian Centre for Justice Statistics

Crime and Justice research paper series

Cumulative Index

The **Canadian Centre for Justice Statistics** (CCJS) was created in 1981 as a division of Statistics Canada. The CCJS is the focal point of a federal-provincial-territorial partnership for the collection of information on the nature and extent of crime and the administration of civil and criminal justice in Canada. This partnership, known as the "National Justice Statistics Initiative", has become the international model of success on how to develop, implement and manage an effective national justice statistics program. Its analytical output appears in the flagship publication *Juristat* (http://www.statcan.ca/english/IPS/Data/85-002-XIE.htm), in various annual and biennieal publications, and in the *Crime and Justice research paper series* (http://www.statcan.ca/english/IPS/Data/85-561-MIE.htm).

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